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# USSR Report

CONSTRUCTION AND RELATED INDUSTRIES



FOREIGN BROADCAST INFORMATION SERVICE

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## USSR REPORT

### CONSTRUCTION AND RELATED INDUSTRIES

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## CONSTRUCTION PLANNING AND ECONOMICS

### HIGHER LABOR PRODUCTIVITY NEEDED IN CONSTRUCTION

Moscow STROITEL'NAYA GAZETA in Russian 22 Jan 84 p 2

[Article by Deputy Chairman of Goskomtrud USSR Yu. Pak: "The Strategy of Growth"]

[Text] According to the expression by K. Marx, the primary economic law is the law of the increase in labor productivity.

Today, the provisions for its high rate of growth is the strategic direction and the key problem of the development of the Soviet economy. It is necessary to note that during the post-war period the growth in the branch productivity consisted of 5-6 percent on the average. However, starting in 1980, it has sharply slowed down: only 1-2 percent compared to previous year. This has caused a number of negative phenomena in construction.

As a consequence, in the branch, one of the most important proportions of the people's economy was upset--the ratio between the growth rate of labor productivity and the wages: during the last few years, 1.77 to 1.85 percent of wages has been spent for 1 percent of the labor productivity growth. From this follows the overexpenditure of its funds and unfulfillment of the plan for capital accumulation. In our opinion, the main reason for the low effectiveness of the construction production is the weak utilization of the tremendous scientific and material-technical potential accumulated by the branch in the course of its development.

I will refer to the following facts: during the 10th Five-Year-Plan, the growth of the main construction funds constituted 156 percent, mechanical equipment 114 percent, power equipment 124 percent, and the fleet of major construction machines has increased 16 percent. Judging from all appearances, the labor productivity should also have sharply increased. However, its growth constituted only 11 percent, while the plan was for 24.7 percent (according to the sum of the annual assignments).

In the text of Yu. V. Andropov's speech at the December (1983) CPSU Central Committee Plenum it says: "... the organization of the entire complex of scientific-technical work is still far from being well adjusted. In

a number of branches, no headway is observed; the plans regarding new technology are not fulfilled and the scale of these plans leaves much to be desired."

This quote directly applies to the capital construction as well.

The foundation of the scientific-technological progress in the branch is the production industrialization that will permit them to achieve the highest labor productivity. During the current stage, the task is put forth regarding the development of industrial-systematic methods that stipulate the integral connection between the rate of construction of facilities, their design decisions, the structure of material resources, means of mechanization and transportation, and organizational forms of management.

The practical realization of this task depends on the solution of a number of complex problems that are outside of the construction framework as such. In particular, machine builders must find the optimal variants of the technological equipment sizes, decrease its sizes and weight, which will lead to the decrease of the production site and the premises sizes.

A substantial reserve is found in the chemicalization of the construction production, the supply of materials and articles manufactured on the basis of synthetic resins and plastics, and a transition to the production of the most effective brands of bricks, porous ceramics, tri-layered panels with flexible connectors, insulation, etc.

The labor-consumption of roofing work and the prevalence of manual labor doing it is well known. Naturally, under such circumstances, it is not easy to attain high labor productivity. The way out, again, is seen in the utilization of progressive materials: glass ruberoid, guided ruberoids and others.

Also, the necessity for change in the construction machine fleet structure has long since become overdue: there is a need for more multi-scoop excavators, loaders, pipe-layers, short-base cranes with a capacity of 2-3 times bigger than that of their average unit power.

The ways to increase labor productivity, as practice shows, are multifaceted. Let us say, during recent years, the labor expenditures at construction sites have hardly decreased. There are two main reasons: lack of the construction sites supply with the effective materials and structures, and the utilization of manual labor during the industrial building of construction "shells" for the equipment assembly and the construction of partitions, bathrooms, floors, suspended ceilings, etc. In other words, industrialization encounters the antiquated work methods. And this "collaboration" is not quite so "harmless": according to the calculations of specialists, during even the current stage, the transition to full industrialization can increase the plan labor productivity growth by 1/3.

During the coming years, no smaller importance should be attributed to the mechanization and automation of the construction-assembly work, introduction of scientific organization of labor and production, the increase in its general culture and qualification of cadres, and the stabilization of the production collectives.

In combination, all these factors will allow them to provide for the assignment fulfillment for the 11th Five-Year Plan regarding the labor productivity growth by 15 percent. However, during 1981-1982, it increased by only 4.6 percent, compared to the planned 5.6 percent.

In this connection, it is desirable to address our attention to some unutilized possibilities that do not require any capital investments or other expenditures. First of all is the perfecting of the management system in construction production. Today, it is multi-staged and is concentrated mainly in the union and republic construction ministries, their main administrations, associations, etc.

Now, more than 27,000 primary construction-assembly organizations and more than 3,000 trusts function within the system of the capital construction alone. More than half of these have an annual volume lower than the level that provides for profitability of the construction organizations' work. The reasons are clear: small organizations do not normally have the possibility to utilize the construction machines, to introduce new technology and to prepare cadres. It is not surprising that their labor productivity grows slowly. Besides, in the management organs, and in subsidiary and service units of these collectives, there are hundreds of thousands of workers who are not directly involved in the production of material assets.

A characteristic feature of this is that in 1980, the planned volume of construction assembly increased by 4.1 percent, while the number of the primary construction assembly organizations increased by 17.4 and trusts by 8 percent. As they say, no comment is necessary here.

The necessity to decrease the management levels in capital construction, to sharply enlarge the construction-assembly organizations and to simultaneously increase their maneuverability, which allows the possibility to decrease the demand for working cadres, has also been overdue for a long time.

The result is as follows: during the 10th Five-Year Plan, at the expense of perfecting organization of labor, production and management, the labor productivity should have increased by 9.2 percent; however, it increased by only 4.1 percent. The growth reserves here are obvious and, essentially, are there for anyone to see. The fact that they are utilized weakly causes not only material but also moral consequences. The waste of working time entails mass register exaggerations of work which, in fact, is unfulfilled.

No small role in bringing order to the relationship of the trade-related workers and achievement of the high end-result rightly belongs to brigade contracting.

It is precisely through the working brigades that are the primary production collectives, that the participation of workers in the production management is achieved most successfully. However, during the current stage, the introduction of its highest form, integrated flow-line brigade contracting, has become necessary.

A number of problems have to be solved to do this: to adjust the load planning and material-technical brigades' supply for a long period of time (month, year, five-year), to enlarge the brigades within the optimal limits, to connect the work pay for line and other engineering-technical workers with the labor results in brigades that are under their authority, to work out the labor rate system for the brigades of the enlarged size, and to organize a professional preparation of the brigade leaders and teaching workers related and secondary trades. There are also other problems.

As we can see, the tasks are large. And they should be solved today already. Even this year, the construction workers must increase their labor productivity (output) by 3.3 percent. Besides, in the text of his presentation at the December (1983) CPSU Central Committee Plenum, comrade Yu. V. Andropov put forth the goal for construction workers: to seek additional reserves, to attain an over-the-plan labor productivity growth and to decrease the work cost.

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## INDUSTRIAL CONSTRUCTION

### RESOURCE CONSERVATION PROGRAMS FOR INDUSTRIAL CONSTRUCTION

Moscow PROMYSHLENNOYE STROITEL'STVO in Russian No 12, Dec 83. pp 3-5

[Article by A. V. Matveyev, public correspondent, PROMYSHLENNOYE STROITEL'STVO: "Rational Application of Resources in the USSR Minpromstroy"]

[Text] The construction organizations and building industry enterprises of the USSR Minpromstroy [Ministry of Industrial Construction] operate with vast resources. Every year they expend up to two million tons of sheet metal, 700,000 tons of steel pipe, 12 million tons of cement, five million cubic meters of lumber materials, 15 million square meters of glass, 750,000 tons of motor fuel for transport, 670,000 tons of fuel for construction machines and mechanisms, 22 million Gcal of thermal and 2.7 billion kW·hr of electrical energy, as well as 3.3 million tons of boiler and furnace fuel.

In order to increase the level of resource conservation, the USSR Minpromstroy has developed and is presently implementing 11 comprehensive long-term target programs on key problems in the development of the sector. The centralized program, "Economy and Rational Application of Material Resources for the Years 1981-1985", which is aimed directly at fulfilling specific tasks for economizing on sheet metal, cement, lumber materials and reducing the expenditure norms for fuel-energy resources and combustible fuel and lubricant materials, is also in effect.

The USSR Minpromstroy is also receiving high returns from long-term cooperative agreements with the scientific-research institutes of the USSR Gosstroy [State Committee on Construction Affairs]: the NIIZHB [Scientific-Research Institute on Reinforced Concrete], TsNIIPromzdaniy [Central Scientific-Research Institute on Industrial Buildings], TsNIISK im. Kucherenko [Central Order of Red Labor Banner Scientific-Research Institute on Building Structures imeni V. A. Kucherenko], Kiev NIISK [Scientific-Research Institute on Building Structures], TsNIIEPzhilishcha [Central Scientific-Research and Design Institute on Standard and Experimental Residential Planning]; and NIIOSP [Scientific-Research Institute on Foundations and Underground Structures]. In conjunction with these institutes, 38 projects are being implemented on the most important aspects of building production. Based on the projects and proposals of the construction ministry institutes and the USSR Gosstroy, the USSR Minpromstroy compiles lists of progressive economic structures recommended for mass application for each five-year period. Over 60 titles were introduced in the 10th Five-Year Period.

The goal-oriented implementation of a unified technical policy allowed the USSR Minpromstroy in the 10th Five-Year Period to reduce the expenditure of resources by one million rubles of estimated cost of construction-installation work, to fulfill the plan of organizational-technical measures for economy of resources, and to reduce waste of material goods. There was a savings of 186,000 tons of sheet metal, 652,000 tons of cement, 812,000 cubic meters of lumber, 146,000 tons of specified boiler-furnace fuel, 1,400,000 Gcal of thermal energy, and 274 million kW·hr of electrical energy. The production of 22 types of raw structures for industrial construction was organized. Sixty-one percent of the enterprises in large-panel house building were changed over to the output of prospective series residential houses. Two-thirds of these were changed over to the output of houses according to projects which had been corrected from the standpoint of economy on metal and cement. The relative share of fully prefabricated construction comprised of large-size elements, assemblies, panels and block with full prefabrication of the load-bearing and enclosure structures increased from 55.4 percent in 1975 to 72 percent in 1982.

The central link in work on improving the technical level of construction is the introduction of new progressive designs, materials and products, and the application of improved technological lines and equipment at enterprises in the construction industry.

Target projects are being implemented at the USSR Minpromstroy which are aimed at reducing the mass of buildings and structures. In 1982, 4,520,000 cubic meters of load-bearing and enclosure structures were made of lightweight concretes. Today in the ministry every fourth cubic meter of prefabricated reinforced concrete is made of lightweight concrete. All the large-panel houses in Novokuybyshevsk are made entirely of keramzit concrete. In Ufa, houses of the new 108 series, developed by the LenZNIIEP [Leningrad Zonal Scientific-Research and Planning Institute on Standard and Experimental Design of Residential and Public Buildings], are also built entirely of keramzit concrete. The application of lightweight concrete instead of brick and heavy concrete makes it possible to reduce the weight of structures by 35 percent, the expenditure of steel and cement by 10 percent, and the labor consumption in construction by 20 percent.

At the present time, the USSR Minpromstroy has adopted the course of widespread introduction of large-span slabs of type KZhS and T with dimensions of 3x18 and 3x24, centrifuged columns, box-type slabs with span of 18 m, KZhS arch-casings, asbestos cement extruded panels, gypsum-cardboard frame lining partitions, plastic pipes and structures made of grades M500 and M600 high strength concrete for building large-panel houses on piling foundations without foundation mats.

For the present, documentation has been developed for the technical retooling of over 100 enterprises in the construction industry. The Stroyindustriya KTB [Design-Technological Bureau] of the USSR Minpromstroy has adapted various technological lines and equipment for over 300 enterprises.

Joint work with the NIIZhB on the introduction of thin-walled reinforced concrete casings with thickness of 4-5 cm is promising. The technology for

manufacturing such structures is being developed at the ZhBI-5 Plant of the Zhelezobeton Trust within the Ryazan'stroy Administration. A target program on their application in construction has been jointly ratified with the USSR Gosstroy. These casing panels are more economical than the KZhS type covering slabs. The concrete expenditure is 40 percent less, and the metal expenditure is 32 percent less.

The application of monolith reinforced concrete coverings and profiled sheeting in the form of non-removable casings is increasing in construction. (These are manufactured according to projects of the NIIZhB and TsNIIpromzdaniy). This reduces labor expenditures by 20-30 percent. The application of coverings and walls for production buildings made of asbestos cement corrugate sheets VK with length of 3 m and UV-7.5 with length of 2.5 m (developed by TsNIISK) is also increasing. As a result, the structures will have only 1/3 or 1/4 the weight and only 5/7 to 10/19 the amount of metal will be used.

The USSR Minpromstroy was the first in domestic construction to organize its own production and on-site application of highly effective columns of round section. The technology of their manufacture was developed by the Stroyindustriya KTB of the ministry. This innovation provides for a reduction in concrete expenditure used at construction sites by over 40 percent, a 30 percent reduction in steel expenditure, and requires 1/3 the amount of labor expenditure.

The extensive application of columns with annular section, box sheeting, and integrated covering slabs in the construction of the Kobrinsk Textile Weaving Factory in Belorussia made it possible to reduce the cost of the facility to almost half as compared with a project using traditional structures. The repeated application of long (3x18m) box-type covering slabs at facilities in the Ukraine and Belorussia has provided an improvement in the operational qualities of the textile enterprises, a reduction in their cost, and a significant reduction in the metal expenditure.

In 1982 the ministry collectives began using KZhS casing panels developed by the USSR Minpromstroy KTI [Kostroma Technological Institute] for the construction of agricultural production buildings with span of 21 meters. The experimental construction of a grain warehouse in the Kolkhoz imeni Sverdlov in Dubenskiy Rayon of Tula Oblast showed that the cost of construction work is reduced by 30 percent as compared with standard buildings of analogous function, while the labor consumption is reduced by 40-50 percent.

The application of gypsum-cardboard frame-lining partitions is increasing. These are being used in building domestic accommodations in industrial buildings and social, cultural and domestic facilities. A construction industry base is being developed for this purpose. Shops are being built for manufacturing partition frame profiles at enterprises in the Ukraine and in Tula Oblast, and the Novomoskovskiy Gypsum Combine is being reconstructed. Each cubic meter of such production saves up to 12 kg of steel and almost one man-day in labor expenditures.

The scope of application of piling foundations is growing rapidly. Specifically, in residential construction their relative share has reached 55 percent.



The expenditure of cement is reduced by 25 percent as compared with strip foundations, and there is a significant reduction in labor expenditure. Piling foundations without foundation mats are especially economical. As compared with traditional foundations, there is a savings of one kilogram steel and five kilograms cement for every square meter of area. It has been decided that by 1985 the level of their application in large-panel house construction will be brought to 30 percent of the annual work volume.

Working in conjunction with the TsNIIpromzdaniy, the USSR Minpromstroy is developing and introducing variants of large-panel domestic buildings for industrial construction to replace the II-04 series frame-panel buildings. The effect of this replacement is as follows: labor expenditures are reduced by 30 percent and metal expenditure is reduced by 15 percent.

The TsNIIEP for commercial-domestic buildings and tourist complexes has developed blueprints for the ministry for standard panel structures of plant manufacture for the construction of series 1.220.1-2 buildings (kindergarten-nursery schools, schools, trade centers). The technology of manufacture and installation of the reinforced concrete structures is simplified as compared with the frame-panel variant, the degree of plant readiness of the buildings is increased, the labor expenditures are reduced by 30 percent, and the steel expenditure is reduced by 9-11 kg per square meter of usable space as compared with series II-04.

The volume of application of reinforced concrete structures is huge in the sector. The reduction in metal expenditure and cement use promises great advantage. For the present, every third cubic meter of prefabricated reinforced concrete structures which the ministry's enterprises make is prestressed. Eight to ten kilograms of steel are saved on each cubic meter of products. The application of prestressed structures and the tie-frame variant of improved series II-04 has made it possible for the ministry to save 20,000 tons of steel.

A promising direction for economy is the qualitative change in concrete and reinforced concrete. There are significant advantages to the application of lightweight concretes made with new types of porous fillers. Their application for outside walls and integrated covering and roofing slabs reduces the weight of the buildings by 30 percent, the steel expenditure by 15-20 percent, the cement expenditure by 10 percent, and the labor expenditure by 20 percent.

It is expedient to orient the construction industry toward the production of structures made of high-strength concrete. In 1982 in Rovensk Oblast a plant was built for manufacturing reinforced concrete structures made of high-strength concrete with capacity of 100,000 cubic meters. The steel expenditure here was 25 percent less as compared with traditional grades of concrete. The savings on cement is much less when computed per structural element. This opens the possibility of transition to principally new and more expedient design schemes for installation of the structures.

During 1981-1982 the ministry introduced three technological lines for the manufacture of large-span structures. By the end of the five-year period,

eight more will be in operation. (These manufacture type P and KZhS covering slabs with dimensions of 3x18 and 3x24 m, developed by NIIZhB, TsNIISK and NIISK). This makes it possible to reduce the steel expenditure per square meter of building covering area by 15 percent and the expenditure of concrete by 10 percent.

The use of chemical additives makes it possible to realize a significant savings on cement. The ministry's Stroyindustriya KTB has manufactured and delivered to the enterprises around 150 sets of equipment for automatic preparation and batching of chemical additives. At the present time, the ministry's enterprises manufacture only 15 million cubic meters of concrete mixture using chemical additives. The volume of superplasticizer application is increasing, which saves 30 kilograms of cement per cubic meter of mixture. In connection with this, we consider it expedient for the USSR Minkhimprom [Ministry of the Chemical Industry] to organize the widespread centralization of production of the superplasticizer-thinner S-3. Cement is also saved by means of introducing industrial partitions made of gypsum-cardboard sheets. In 1983, with the introduction of a new shop for the manufacture of such sheets at the Novomoskovskiy Gypsum Combine, the base potential will be increased by another 2.3 million square meters of sheeting.

Non-productive losses of cement are being reduced. For this purpose, the enterprises are being equipped with automated storehouses. Their number has presently exceeded 500, with capacity of 760,000 tons. In 1981-1982, 40 technological lines eliminating cement losses were placed into operation.

The application of casing-free forming of prefabricated reinforced concrete products saves a considerable amount of metal (16 kg per cubic meter). To increase the sphere of its application, it is necessary to organize efficient manufacture of principally new tackle rigging means, load-gripping attachments and stock inventory.

An important direction in economy of reinforced concrete in the industry is the application of metal forms with minus-level margins, and especially in the manufacture of such products as covering slabs, honeycomb sheeting, cartridge holder and other products having large surface areas. Here, every possible millimeter should be conserved. For example, increasing the thickness of covering slabs by one centimeter entails a 10 percent overexpenditure of concrete.

The ministry's Stroyindustriya KTB has developed a set of progressive design variants for metal forms. Standardization of the forms and accessories has improved the quality of production. The service life of the forms has significantly increased, which saves 3,000-5,000 tons of steel annually.

The reduction of metal consumption in the construction industry by means of reducing time for heat processing seems promising. Thus, the application of the induction method of heat treatment for columns and spanners in the semi-conveyor line at the Glavbryanskpromstroy has made it possible to perform the entire cycle of heat treatment in 7.5 hrs and to reduce the supply of forms to one-half the previous number. Computed annually per line, there is a savings

of 200 tons of metal and a 35-40 percent lower expenditure of thermal energy per unit of production.

In the sphere of economy of lumber materials, much attention is being given to the utilization of by-products from wood processing and logging: the manufacture and application of wood-splint and wood-fiber slabs for laying floors and making built-in furniture, the production of cement-wood shaving slabs and laminate wood products, and the end-gluing of scrap pieces. In the current five-year period, over 7,000 stock buildings of the portable and container type have been built. The effect of savings is seven cubic meters per building. A large amount of commercial lumber is saved with the introduction of progressive types of casings, effective lumber cutting, and use of saws with thickness of 1.8 and 2 mm and blades made of hard alloys. The USSR Minpromstroy NIIPromstroy [Scientific-Research Institute on Industrial Construction] has developed and coordinated with the USSR Gosstroy a sectorial catalog of wood structures for potash enterprises, which will ensure a significant savings in materials and labor expenditures.

The ministry ensures savings of fuel and energy resources primarily by means of the reconstruction and technical retooling of pit steam chambers and cassette-forming installations.

The long-term program for reduction of thermal energy expenditure in the production of reinforced concrete provides for the reconstruction and technical retooling of 4100 chambers, including the automation of over 1,800 chambers. In connection with this, the KTB Stroyindustriya has developed and is introducing several variants of steam chambers which will use only 1/2 or 1/3 the amount of heat. The complex of measures for the current five-year period provides for a 25-30 percent reduction in steam expenditure.

The application of electroinduction chambers for heat treatment of reinforced concrete products yields a significant effect, making it possible to reduce the heat expenditure by 30 percent as compared with the standard steam chambers. Such chambers are being installed at enterprises in Bryansk, Minsk and Krasnodar. Double-slotted chambers for treating reinforced concrete products in products of combustion of natural gas using thermal generators are being used at the Ordzhonikidze and Nizhnevartov DSK [house building combine] and at Trust No 14 of the BSSR Minpromstroy. The heat expenditure for these chambers is 25-30 percent less.

In 1982, the development of technology and equipment for thermal treatment of reinforced concrete products using a heat vehicle in the form of hot aerated water was completed. Repeated circulation of the water which is not fully cooled saves 30-35 percent of the fuel needed for heating. A project has been developed for a chamber to process reinforced concrete products with the use of solar energy. A pit-type steam chamber with effective multi-layer film-air insulation has been tested at the Ryazan'stroy Association. The steam expenditure for this chamber is 84,000 kcal/m<sup>3</sup> (with the average norm being 200,000 kcal/m<sup>3</sup>).



The favorable outlook of replacing the water vapor energy vehicle with electrical current in thermal processing is evident. The use of products of natural gas combustion as the heat vehicle makes it possible to reduce the expenditure of technological steam from 450-500 to 150-250 kg/m<sup>3</sup>. The time is ripe for transition to steamless technology. Scientists and scientific-research institutes must immediately tackle the solution of this problem.

Drying chambers at wood processing enterprises are also being automated. The pool of trailers and semitrailers is expanding. Their application saves a significant amount of diesel fuel. In this five-year period, the volume of centralized shipments will be brought up to 76 percent.

The ministry obtains significant savings from the application of by-products and secondary resources.

The Orgtekhstroy Trust of the AzSSR Minpromstroy, in conjunction with the Tallinn Institute Silicate Concrete NIPI [Scientific-Research and Planning Institute] of the USSR Minpromstroymaterial [Ministry of the Construction Materials Industry], studied the possibilities of using the sand fractions of slurry by-products from KirAZ [expansion unknown] for the production of autoclave hardened cellular silicate concretes. The technology has been developed for the production of ultra-light structural thermoinsulating concrete which surpasses world standards by its technical indicators. This concrete may be used to make outside wall panels, and covering and roofing slabs with overall weight of 600 and 700 kg/m<sup>3</sup>. Every year it is possible to obtain over a million cubic meters of products on the basis of KirAZ raw material and to fully supply Azerbaijan construction sites. This will yield an annual savings of hundreds of tons of cement and sand, over a million tons of rubble, and around 1.5 kcal of electrical energy. Only 5/9 of the amount of capital investments will be required for making the products, and mechanisms and equipment used for obtaining building materials required for the production of reinforced concrete structures as well as the work force will be freed for other uses. Also, the labor consumption for the construction process itself is reduced, since plastering and thermoinsulation work is eliminated.

Working in conjunction with the Kazan Chemical-Technological Institute, the USSR Minpromstroy has developed a technology and project design for a shop manufacturing VRS resins from by-products of aceto-phenolic production. The capacity of this shop is 2,500 tons, which makes it possible use only 1/3 the amount of phenol, which is in short supply, in order to obtain 30,000 cubic meters of high quality foam plastic. The possibility of full utilization of by-products from soda production has been confirmed for obtaining a lime-containing binding agent of grades 300 and 400 and for product manufacture using the non-autoclave method. At present there are 20 million tons of such by-products.

The USSR Minpromstroy NIIPromstroy has developed a technology for obtaining a lime-containing binding agent based of the application of by-products from soda production. A plant with capacity of 30,000 tons of this binding agent has already been built, giving a direct savings of cement in the amount of 30,000 tons. A shop for the production of cellular concrete using these same by-products is under construction. In 1983 it will already be manufacturing

masonry blocks with overall weight of 400-500 kg/m<sup>3</sup>. The annual capacity of this shop will be 100,000 square meters of farmstead type residential housing.

It is expedient to use ash-slag by-products in the preparation of concrete. In this case, it is advantageous to use integrated disperse fractions as an active additive to the cement, and to use large fractions as the filler. This saves 50 kg of cement per cubic meter of concrete. It is useful to develop the production of slag-alkali concretes. Experience in this area may be borrowed from the collectives of the UkSSR Minpromstroy, Glavomskpromstroy [Industrial Construction in Omsk Main Administration], and Glavvostoksibstroy [Construction in Eastern Siberia Regions Main Administration].

Utilizing the by-products of reinforcement armature production in the USSR Minpromstroy makes it possible to save up to 10 percent of steel, which is in short supply, as well as to utilize recycled petroleum products.

The economic utilization of resources is significantly facilitated by the organization of their final processing, processing and complementation at UPTK [Administration of Production-Technological Complementation] bases. For example, at the Glavvostoksibstroy the organization of centralized patterning and complementation of window glass makes it possible to reduce labor expenditures to 2/5 of that required for pattern cutting at the construction site, saving 10 percent on glass and utilizing the by-products for cutting plate glass and glass inlay. This saves 24 rubles per 1,000 square meters of product. The manufacture of "room-size" linoleum sheeting at the UPTK requires only 1/2 the labor expenditure and reduces waste to a minimum. The centralized preparation of wallpaper in shops using wallpaper cutting machines and machine tools with semi-automatic control, as well as complementation by apartments reduces the labor expenditures for hanging wallpaper by 25-30 percent and the material expenditure by 5-6 percent. By 1985 it is planned that the average level of material finishing will be brought up to 65 percent and meet 75 percent of the need for means of containerization and packaging. The ministry is comprehensively developing engineering production-technological complementation. Of 255 general construction trusts, UPTKs function in 229 of them. Today over 97 percent of the ministry's contract work program is performed by the trusts, in which the UPTKs are active.

The USSR Minpromstroy is implementing the long-range target program "Komplekt" [full complement]. Three basic problems are solved within its aspect which affect the rational application and economy of resources. The first is organization of planning of material-technical provision for construction on the basis of UNTD (unified normative-technological documentation) development on complementation. The second is the organization of final processing of construction materials and products for the purpose of increasing their production readiness and reducing waste at the UPTK bases. The third is the organization of centralized manufacture and mass application of means of containerization and packaging with the use of specialized transport. Here we should borrow from the foremost experience of the BSSR Minpromstroy and the Glavvostoksibstroy.

The USSR Minpromstroy is bringing order to the normative system, ensuring the rational and economically prudent expenditure of resources. For this purpose, the ministry has developed and ratified the "Directives on the Order of Development, Coordination and Ratification of Production-Technical Expenditure Norms for Cement, Sheet Metal and Wood at the Construction Industry Enterprises of the USSR Minpromstroy" - VSN-65.08.81. There is in effect a target comprehensive program, "A System of Progressive Technical-Economic Norms and Standards in the USSR Minpromstroy for the Years 1981-1985".

The ministry participates in the implementation of the USSR Gosstroy program for introducing the General Production Norms for Material Expenditure into construction. The ministry has already worked out two manuals of such standards: for the installation of prefabricated reinforced concrete structures and for floor installation. Such norms have been introduced for five construction processes worked out by other ministries and departments. In this regard, we would like to turn the attention of the USSR Gosplan [State Planning Committee] and the USSR Gosstroy toward the necessity of unifying the methodology of planning the economy of materials, fuel-energy and fuel-lubricant materials in capital construction. The methodology of standardization should be improved in the sector. The "bottleneck" remains the correlation of production and estimate norms for resource expenditures.

The question of increasing the reserves on hand of sheet metal as well as other resources still awaits thorough examination. The gap which has currently developed between norms for on-hand reserves of resources, the conditions of their use and technological requirements leads to significant losses in the application of materials and enterprise capacities.

For the current five-year period, the USSR Minpromstroy has worked out organizational-technical measures for the economy of resources which make it possible to economize around 936,000 tons of cement, 328,000 tons of sheet metal, 439,000 cubic meters of lumber materials, 373 million kW·hr of electrical energy, 107,000 tons of boiler-furnace fuel, 1,600,000 Gcal of thermal energy, 87,000 tons of gasoline, and 71,000 tons of diesel fuel.

The ministry's collectives are actively participating in the All-Union Public Review of the Effectiveness of Utilizing Materials and Fuel-Energy Resources. Our task is to bring into action the entire arsenal of means for economy and to worthily respond to the requirement of economy and thrift formulated by the November (1982) Plenum of the CPSU Central Committee.

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## INDUSTRIAL CONSTRUCTION

### RENOVATION PROJECTS NOT ATTRACTIVE TO CONTRACTORS

Moscow STROITEL'NAYA GAZETA in Russian 10 Feb 84, p 2

[Article by I. Eykhval'd, chief of Construction Production Preparations Department, and V. Gaag, chief of advanced know-how propaganda group of the Scientific and Technical Information Department, Orgtekhstroy (Trust for Organization and Technology of Construction Production), Voronezh TUS (Technical Administration of Construction): "If Approach Is Changed"; response, with specific recommendations for improving the organization of renovation projects, to the article by K. Glukhovskaya and N. Kirillov, "Reconstruction: Amendment to Practice", published in STROITEL'NAYA GAZETA, Sep 83, which addressed the question of why reconstruction work may be unprofitable for contractors]

[Text] Let us try to answer simply and clearly the question of why reconstruction is not profitable for contractors. There are actually many reasons. However, the main reason lies in particular, in difficult working conditions. This is precisely the opinion of many of the participants in this discussion.

By what criteria are working conditions determined? If we exclude climatic, geological and other conditions which are similar for all types of construction in a specific region, then we will see that the construction site is the chief determinant.

Sites are most diverse, as is well known. During reconstruction and expansion of operational enterprises construction and installation work may be carried out under normal conditions (construction of new projects), under cramped conditions (construction of projects between existing buildings), and inside shops. These are the factors decisive for builders in assessing whether it will be profitable or unprofitable for them to undertake the work.

It is easy to imagine a dialogue between an enterprise director and trust manager, with the former saying: "We need to rebuild the machine-shops complex. Will you do this work?" The trust manager might respond: "We will build the new shop and substation and, perhaps, the annex to the shop. But everything else -- only on the condition that it be considered as capital repair."



As you see, the conversation is of a haggling nature and is a usual and paradoxical scene. It is paradoxical because reconstruction, according to the present status, is the same type of construction as new construction. However, new construction is profitable for contractors and reconstruction is not.

Since it is a question of construction types (that is, conceptions of one level), they should be equally profitable or equally unprofitable. In our view, the danger of going to extremes appeared during the discussion in STROITEL'NAYA GAZETA [Construction Gazette]. In the article "In Position of Cinderella" (STROITEL'NAYA GAZETA, 28 Sep 83) V. Gladyshev writes: "It is especially necessary to give preferential treatment to reconstruction in comparison with new construction". Does this mean that we should now turn everything around and make reconstruction profitable for contractors and new construction unprofitable? Well, it appears to mean this. V. Gladyshev is not right if he has in mind reconstruction as a variety of construction. And, on the other hand, he is entirely correct if he has in mind the reproduction of fixed capital in industry.

The time has come to recall the directive of Gosplan USSR and Gosstroy USSR in which concepts of construction types are defined or, as a matter of fact, classified. Meanwhile, such a most important feature as the construction site was not mentioned. As a result, characteristics of operations and the conditions in which the work is performed are not taken into account during the reconstruction of operating enterprises.

A curious situation has emerged — people work under cramped conditions but all the settlements are made in accordance with the normative base for construction at new sites. Correction factors have not solved the problem -- reconstruction is not profitable for the builders. During the discussion the authors cited different factors, the values of which they derived by an empirical method.

It is possible that the introduction of new coefficients will improve the state of affairs for a certain time. However, we do not think that this will provide a fundamental solution of the problem. Therefore, we fully agree with A. Zinchenko, who writes: "Even the highest averaged correction factor stimulates simpler work. This means that it is necessary to develop a new system and instructions based on the actual state of affairs instead of trying to improve those presently in force. ("According to Obsolete Instructions," STROITEL'NAYA GAZETA, 26 Oct 83).

How can the problem be solved? In our view, the solution is as follows. First, it is necessary to recognize that enterprise reconstruction as a form of reproduction of fixed capital is accomplished through several types of construction. Secondly, it is essential to work out a new classification of types of construction based on the indicator "characteristics of construction site", which defines the conditions and special features and, as a consequence, the possible level of organization of work on a specific project.

We have attempted to work out such a classification, which we picture as shown below.

**Unrestricted Construction** -- Includes construction-installation work at sites of operational enterprises which satisfy requirements for normal organization of the construction process. Normal conditions for performance of work under which it is possible to use industrial construction methods without any limitations are the distinguishing feature of unrestricted construction.

**Restricted Construction** -- This is the production of construction-installation work on sites of operational enterprises where existing facilities hamper normal organization of the construction process. Such facilities may be situated on the site itself or near it, limiting its dimensions.

**Intrashop Construction** -- Includes work in existing buildings and structures of operational enterprises.

We are certain that the introduction of such a classification would have great practical significance. The fact is that the establishment of a well-defined normative base for each type of construction will be the result.

The necessity for such a formulation of the problem is obvious. If we look at the experience of industry, we will find examples there of the use of the normative base not only at the level of production types but also on the lower levels. Therefore, it is considered inadmissible to reflect work of the press shop by means of normative indices of the machine shop although there is machine building production in both and both subdivisions pertain to metalworking. It is possible to explain precisely through a well-developed normative base that such sharp problems of "profitability" or "unprofitability" of one production or another need not arise at the level of its types in industry.

The active course of the discussion in STROITEL'NAYA GAZETA emphasizes the timeliness and urgency of the problems raised. The benefit of this discussion is indubitable -- a number of valuable recommendations have been collected in the "money-box". We are certain that many other practical specialists are also ready to vote without hesitation for such things as the provision of builders engaged in reconstruction with special machines and mechanisms for work under cramped conditions and the allocation of material-technical resources for enterprise renovation not from the "little million" but in direct conformity with technical documents and estimates.

Much experience has been accumulated in the organization of construction production at operational enterprises which should be generalized and disseminated. But the introduction of all the proposals of the discussion participants can produce the greatest effect only on the condition of the solution of such fundamental problems as those discussed above.

After solution of the above-noted problems it will then be possible to have an entirely different conception of the dialogue between the client and contractor, with the former saying: "We need to renovate the machine-shops complex. Will you do this work?" The response of the contractor may then be: "Let us conclude an agreement on unrestricted (new shop), restricted (annex to the old shop), and intrashop construction.

Naturally, the classification of types of construction -- intrashop, restricted, and unrestricted -- requires the establishment of a well-defined normative base for these types of construction.

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## AGRICULTURAL CONSTRUCTION

### AGRICULTURAL CONSTRUCTION MINISTER REVIEWS 1983

Moscow STROITEL'NAYA GAZETA in Russian 15 Jan 84 p 2

[Article by V. Danilenko, USSR Minister of Rural Construction: "Industry of the Farm"]

[Text] The third year of the 11th Five-Year Plan has passed into history. It was a year of great and hard work by rural builders -- partners in the agro-industrial complex. As compared with 1982, a 4.4 percent increase in the growth of fulfilling work volumes was achieved. The contracting organizations of the USSR Ministry of Rural Construction have made a sizeable contribution to solving the problem of radically improving the residential and social-domestic living conditions of farm workers. In the three years of the 11th Five-Year Period, residential housing with an overall area of 18,400,000 square meters has been built and submitted for operation, as well as schools and vocational-technical schools accommodating 923,000 students, a large number of children's preschool institutions, public health facilities and facilities of communal-domestic function. The start-up program for residential and cultural-domestic construction has been fulfilled in 1983.

It is difficult to list all the good works. After all, a detachment of rural builders numbering in the millions is working from Kaliningrad Oblast to Kamchatka. Up to 40,000 facilities are being built on the wide open spaces, and each of them, when introduced into operation, begins to work toward the USSR Food Program.

The results are there, but we are unsatisfied with them. The ministry has not totally fulfilled individual tasks in plans for the three years of the current five-year period. Certain capacities for agriculture have not been introduced. In critically evaluating this situation, a sectorial staff, together with the main customers-- the union republic Minsel'khoz [Ministry of Agriculture], Minplodovoshchkhov [Ministry of the Fruit and Vegetable Industry], Minzag [Ministry of Procurement], Minmyasomolprom [Ministry of the Meat and Dairy Industry], Minpishcheprom [Ministry of the Food Industry] and Goskomsel'khoztekhnika [State Committee for Agricultural Technology] -- are closely examining the state of affairs and are taking the necessary measures for intensifying work.



There are many unsolved problems in capital construction. The CPSU Central Committee Secretary General Yu. V. Andropov referred to them in the text of his speech presented at the December (1983) Plenum of the CPSU Central Committee: "The key to success...is in increasing the responsibility of the labor force, in high requirements set for them for irreproachable fulfillment of their duties, for precision and initiative, and uncondition fulfillment of the tasks before them." These directives obligate us to ensure precise organization of work at every segment of management and production.

Specifically, the resolution of the December (1983) Plenum of the CPSU Central Committee states that attention to strategic problems of developing the national economy should not be diverted in the course of solving current problems. The prospects for developing the sector's industry may be termed as the most important of these national economic problems as applied to the tasks of rural construction.

Recently the collegium of the USSR Ministry of Rural Construction examined a "Scheme for the Development and Location of Construction-Installation Organizations of the USSR Minsel'stroy and Their Material-Technical Base to 1990 and for the Period to the Year 2000". This is a long-term comprehensive program in which science and technical progress play a major role.

It is a known fact that many enterprises in the building industry are presently operating below full capacity. Increasing the use factor of available capacities, reconstruction and technical retooling do not require significant capital expenditures. However, the yield on invested capital is quickly realized and affects the increased effectiveness of production in a very short time. Therefore, provision has been made for directing up to 55 percent of the capital investments allocated by the ministry for the creation of industrial enterprises in its own base toward these measures.

The key task in the sphere of economics is increasing labor productivity. In the current five-year period, the ministry must ensure the growth of this indicator by 15-17 percent. Previously these figures were computed on the basis of the condition and availability of a material-technical base for construction. The "Scheme" developed and coordinated with the USSR Gosplan proposes such a variant for development of a base which would ensure a growth in work volumes (with given rates of increasing labor productivity) without a significant increase in the number of workers, but based entirely on growth of their output.

The level of this output is influenced by various factors whose effects are not uniform. Industrialization of construction -- the basic factor -- makes it possible to make the transition to erecting fully prefabricated buildings and structures. This problem may be solved only on the basis of growth in the technical level of all segments of production, including the material-technical base. Based on the projected growth in construction volume, provision is made for the balanced development of its capacities -- due to reconstruction and technical retooling. In planning the siting and work load of enterprises producing prefabricated reinforced concrete, including large-panel and large-block house building, the "Scheme" for the entire period contains computations

according to variants which require minimal expenditures. Of 884 enterprises, 143 are already scheduled for technical retooling in the next five-year period, and 56 for expansion. Only 21 facilities will be rebuilt, generally in remote and little developed rayons. At all of these facilities, progressive technology and equipment for the manufacture of effective structures for industrial and residential construction in rural areas and leading labor methods are projected. Primary attention for the present will be given to improving the construction-installation flow (ZBI [reinforced concrete products] plant (KPD) -- transport -- construction site), thanks to which a large portion of the labor expenditures will be transferred from the construction site to plant conditions. The production of prefabricated reinforced concrete structures of mass-produced series will be implemented on the basis of flow-aggregate and conveyer technological lines, with preference being given to a flexible technology with rapidly retooled processes.

The introduction of the volume-weight method of batching porous fillers, of waste-free armature cutting, and of vibrationless technology for filling casings is planned. The basis of these developments is the principle of economy. As an example, in order to reduce the expenditure of thermal energy, provision is made for the widespread application of modernized steaming chambers with improved thermoinsulation of the enclosure surfaces and strictly measured steam supply. The introduction of such chambers is already in full swing. Moreover, special devices will be introduced for returning the used vapor condensate to the heat and power plant for secondary utilization of heat, as well as many other things. The application of load-bearing and enclosure structures made of new types of lightweight concretes will conserve valuable raw material which is in short supply.

In areas having a raw material base for this, the output of wood laminate constructs and extruded asbestos cement panels will be increased. The widespread use of new effective products based on arbolite, perlite, gypsum, and phosphogypsum is planned. The efforts of the sector's scientific institutes are directed toward the development of materials having improved parameters and new design and project decisions based on them.

Much attention is given in the "Scheme" to technical progress directly in construction. The application of the weld-free method of building installation, shallow foundations, effective types of piles, foundations in vibration-packed pits, industrial floors and roofing elements of maximal plant prefabrication will be widespread. There are plans for improving the storage, warehousing, and transport conditions of construction materials, as well as for the further improvement of work at the UPTK [Administration of Production-Technological Arrangement] bases and mechanization services. Provision is made for an extensive program of scientific, planning and experimental work for seeking and utilizing reserves for reducing construction cost, for improving its quality, for creating energy-saving technology and waste-free production, and for a significant increase in the application of inexpensive local building materials. The organization of exemplary model enterprises and construction sites will facilitate the mass introduction of foremost experience.

The SSK and SDSK [expansions unknown] are a progressive form of organizing labor in rural construction. Their number is planned to increase from 58 to 115 by the year 1990. With the introduction of flow-line production at them (plant — UPTK — construction site), higher growth rates in labor productivity are anticipated and there will be greater capacities for the widespread introduction of the multiple-skill brigade order.

The CPSU Central Committee resolution dated 25 February 1983, "On Measures for Ensuring the Fulfillment of Plans for the Construction of Residential Houses and Social-Domestic Facilities" presents the task of increasing volumes of residential construction, including farmstead type houses in rural areas. There are plans to bring the introduction of residential housing up to 12,000,000 square meters by 1990, as compared with 6,000,000 in the current year. For this purpose, the output of structures and full assortments of houses is being developed at operating enterprises of the construction industry, and new capacities are being created. The level of fully prefabricated residential construction will be increased to 80 percent.

At the present time, our collectives annually erect around one million square meters of farmstead type houses. By 1990 this figure will more than triple. It is clear that the problem of cost reduction, which is acute at the present time, will become even more significant and will have to be solved in an integrated manner. The USSR Minsel'sstroy must adapt part of the capacities of its industrial base for manufacturing complete assortments of farmstead type residential houses according to rational project plans.

Along with the growth in construction volumes for residential houses of the farmstead type, it is also necessary to expand cooperative residential construction by means of state capital investments.

We must stress the important role and responsibility of project planners at the Gosgrazhdanstroy [State Committee on Civil Construction and Architecture] who must develop new model projects which meet the high requirements both in quality and in cost. In this case it is necessary to introduce an all-state system of standardization with maximal unification of products and parts of farmstead houses. The number of these products must be minimal, and the products themselves must be technologically effective in mass production. This is the key to their cost reduction.

The time has come for the major evaluative indicators of the developed standard projects to create an indicator of labor consumption at the construction site. The expenditures of human labor must be computed more thoroughly at the planning stages, along with monetary and estimated expenditures.

A true accounting of labor expenditures at all stages of technical documentation development must, of course, start with improvement and updating of the normative documents and with bringing them closer to actual conditions of rural construction.

If we are presently striving to conserve all types of materials, every gram of fuel, every kilowatt of electrical power, then we must certainly conserve human labor. Here the project planners have the first say. They have a



special responsibility for the effective development of new and the improvement of existing structural and technological decisions in production buildings and structures, residential houses, and facilities of cultural-domestic function in the rural areas. The builders and customers themselves must also not shirk away from this matter. In short, a creative approach is needed here on the part of all the specialists in order to solve the problems presented on a high professional level.

As concerns the improvement in the organization of construction itself, here we have much to do both at present and in the future. The territorial spread of relatively small facilities leads to a more complicated system of management which presents high requirements for its rational organization. Management of construction must be based on engineering preparation for production implemented on the basis of normative technological documentation. Certain experience in this direction has been accumulated at the Belorussian Minsel'stroy, where engineering-technological preparation is implemented on the basis of organization of planning and control not according to individual types of work, but according to technological complexes (flows) performed by a single work brigade. The specialization and technological coordination of the work of all executors is determined with consideration for economic interests of the construction participants. Therefore, this experience must be more actively promulgated.

Speaking at the June (1983) Plenum of the CPSU Central Committee, the secretary general of our party's Central Committee Y. V. Andropov said that it is important "to ensure the well-adjusted work of the entire economic management mechanism. This is both the demand of the present day and the program task for the future." Our efforts at improving the organizational and technical level of conducting work are based on the improvement of building production itself. The resolution of the CPSU Central Committee and the USSR Council of Ministers, "On Measures for Accelerating Scientific-Technical Progress in the National Economy," also points us toward this end.

The realization of the comprehensive program for the development of a production base as noted by the ministry will make it possible to elevate rural construction to a qualitatively new level and to improve it in an organizational and in a technical sense. This means that there will not only be more construction in rural areas, but also that it will be more rapid and of higher quality.

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## AGRICULTURAL CONSTRUCTION

### GOSSTROY VICE-CHAIRMAN OUTLINES RURAL CONSTRUCTION PLANS

Moscow SEL'SKOYE STROITEL'STVO in Russian No 12, Dec 83 pp 1-3

[Article by Yu. Bukin, deputy chairman, RSFSR Gosstroy [State Committee for Construction Affairs]: "Improving Rural Planning"]

[Text] The social reorganization of the farm as a component part of the Food Program is a most important all-state task directed toward securing the work force on the farm, increasing their cultural and agrotechnical knowledge, and improving conditions of work, everyday life, and recreation.

The realization of these program measures presents new major tasks for on-site planning organizations and architectural services. Among these we must list the clarification of the system of rural settlement, provision for the development and correction of general plans for rural settlements with consideration for the predominant building of farmstead type residential houses, selection and application of the most promising types of projects for residential houses and public buildings in rural construction with consideration for the peculiarities of the existing base of the construction industry and industrial building materials, as well as the solution of problems associated with implementing integrated building and improvement of rural areas, overall development of individual and cooperative construction, the transport network and engineering equipment.

As we know, the system of settlement in the territory of agricultural enterprises was predetermined by projects. rural regional planning of administrative rayons which were developed generally in the 60's and 70's. According to these projects, the concentration of production and residential-civil construction was planned primarily at the central farmsteads of agricultural enterprises. As a result, integrated construction of the central farmsteads was implemented at numerous sovkhozes and kolkhozes in the republic, with a high level of engineering equipment and improvements. This fact is evidenced, in particular, by the broad representation and mass quality of the last (1981) All-Union Exhibition and Competition for Better Farm Construction and Improvement. Thirty-nine oblasts, krays and ASSR of the Russian Federation participated in this exhibition, with 17 of the 29 oblasts from the non-Chernozem zone.

At the same time, in developing the projects and diagrams for regional planning, the relegation of a predominant part of the farms to the category of "non-promising" was permitted with insufficient substantiation. Here, new construction was limited, and sometimes also the capital repair of existing buildings.

The experience of the Moscow Oblast is of some interest in this regard. Here, in accordance with the resolution of the party oblast committee and the Mosoblispolkom [Moscow Oblast Executive Committee], work should have been completed in 1983 on the compilation of schemes for intra-management planning. In the course of developing these schemes, three categories of populated areas are defined throughout all the agricultural enterprises of the oblast:

developing areas, in which the basic volumes of production and residential-civil construction are concentrated. These are central farmsteads and production centers of agricultural enterprises;

preserved areas -- the so-called remote villages, in which construction of individual residential houses and institutions for daily cultural-domestic service is implemented by necessity;

de-settlement areas, in which resettlement of the residents is provided only in exceptional cases with the condition that their territory falls into a flood zone, a noise zone from airports under construction or expansion, etc.

Work on the compilation of schemes for intra-management planning in Moscow Oblast is being performed through the efforts of the managements themselves together with regional architectural services and regional agroindustrial associations. Methodological supervision of the work is being implemented by the Mosoblispolkom GlavAPU [Main Architectural-Planning Administration] and the Mosgipronizel'stroy Institute.

It seems that the principle of work organization worked out in the oblast is one of the effective and rational means for clarifying the system of rural population settlement in the interests of developing agricultural production and the socio-economic development of rural areas.

Based on the inventarization of project-planning documentation performed jointly with the planning institutes, the Gosstroys of the autonomous republics, and the oblispolkom and rayispolkom sections on construction matters and architecture must have a clear program for the development and partial or complete correction of general plans for rural settlements. These programs must be ratified by decisions of the obl(kray)ispolkoms, ASSR Sovmins [Councils of Ministers], and reliable control over their realization must be implemented on the part of the rayispolkoms, agroindustrial associations, and most importantly the rural Councils of People's Deputies.

In this matter it is necessary to proceed from the fact that one of the main requirements for the general plans is the reconstruction of farms and villages, the improvement of their planning structure, the preservation of existing buildings and structures and many-year old greenery, as well as the consideration

of the real possibilities of the farms so that architecturally and technically complete residential formations may be created at each stage of construction. The first phase of construction must provide for the formation of a social center and a clearly delineated main street. Based on its social and architectural significance, the social center must occupy a dominant place in the settlement.

The structure of residential building must provide for the predominant construction of farmstead type houses. Apartment house residents should also be provided with conditions for tending personal subsidiary plots.

It is extremely important to increase the "reliability" of general plans, i.e., to prolong the time of their applicability. In order to accomplish this, it is necessary to rid them of excess detail, to use more flexible planning methods which are adaptable to development and transformation.

The volumes of non-production construction in kolkhozes and sovkhoses are presently undergoing a sharp increase. In 1983 such construction increased from 23 to 34 percent of the overall volume of capital investments in the USSR Minsel'khoz [Ministry of Agriculture]. This requires increased effort and goal-oriented creative solutions on the part of designers and architects. This is particularly true for the preparation of project-estimate documentation for farmstead construction. The desire of the rural resident to have an individual house with a plot of land is fully understandable, lawful and traditional. After all, the peasant has long lived and worked on the land and always strived to have his own yard and garden. This brought him creative joy and considerable material reward. Therefore, each successfully built house on the farm is a definite guarantee of the fact that the family which moves into it will strongly associate itself with the sovkhos or kolkhoz. This is a new step in securing the work force, which is so necessary in the realization of the Food Program.

At the same time, each farm worker wants to live in an inexpensive, comfortable and attractive house. The task of the designers and architects consists of doing everything necessary to see that this house meets the high requirements of rural residents while at the same time being simple in its construction and use, and not becoming a "twin" in appearance with neighboring houses.

The multiplicity of territorial-economic conditions in the RSFSR requires a differentiated approach to the application of projects for residential and public buildings in rural construction.

Project planning organizations are faced with the task of more effectively utilizing the fund of standard projects based on an analysis of their applicability, and with the task of broader introduction of progressive technical solutions which ensure reduction in labor expenditures in construction, material consumption, heat loss during operation, and especially construction cost.

The work performed in selecting for each oblast (kray, ASSR) a minimal (25-30) number of projects for residential houses for contract, domestic and individual methods of construction not only does not conclude the question, but aims designers toward a search for project solutions which reduce the cost of



farmstead houses and backyard structures and reduce their labor consumption and expenditure of building materials.

Considerable use should be made in the contract method of construction of projects for industrial residential houses made of keramzit concrete panels (including those made of triple-layer panels with improved thermotechnical indicators) of series 25 and 135 KB over reinforced concrete with different facade variants. Projects for wooden houses of plant manufacture and urban series houses produced by the union construction ministries are also suitable for use.

The application of local materials from natural mineral resources and industrial by-products takes on primary significance. The use of arbolite will make it possible to more fully utilize wood by-products and at the same time to reduce the metal expenditure by 30 percent as compared with the construction of large-panel frame houses. The use of small- and large-size blocks made of gypsum concrete and cellular concrete is also a promising direction in rural construction.

Under conditions of the absence of a construction industry production base, farmstead houses made of monolith concrete (with keramzit or slag fillers) must find broader application. By its technical-economic indicators and labor consumption, monolith house building has certain advantages over brick house building, and by a number of indicators -- also over large-panel house building. Thus, the one-time expenditures for creating a production base for monolith house building are 35 percent lower than for brick building and 40-45 percent lower than for large-panel house building. The steel expenditure in the structures is reduced by 10-20 percent as compared with large-panel construction. The construction time for monolith houses is 15-20 percent less as compared with brick houses.

The use of bore-driven or driven piling foundations is recommended in projects for farmstead residential houses. This significantly reduces the expenditure of armature, cement, and consequently also the cost of the house.

Depending on the local conditions, farmstead houses with full or simplified technical equipment may be used.

At present, unfortunately, it is impossible to build unified sewage facilities for an entire settlement, even in rural areas where mass construction is being planned. Therefore, much attention must be given, primarily at the house building enterprises of the RSFSR Minsel'stroy and Roskolkhozstroyob'yedineniye [Russian Kolkhoz Construction Association], to the development of capacities for the production of compact purification structures for group as well as for individual use. In the meantime, in many cases it will be necessary to make do with pit toilets and outhouses -- with subsequent transition to more effective methods of waste utilization. In these cases, there will also be no indoor plumbing, in connection with which it will be necessary to plan street water pumps. There will also be no hot water. The situation is the same with central solid fuel operated boilers. The problem here is not only the shortage of large capacity boilers, but also the time necessary for build-

ing boiler facilities and the high cost and labor consumption associated with their operation. Here economy must be the criterion.

Practical experience tells us that centralized heating is expedient and necessary for multi-story residences and buildings of social function. The farmstead house, on the other hand, is more economically equipped with an individual system. At the present time, the industry is manufacturing good equipment for this purpose using liquid fuel, gas or electrical power, as well as solid fuel. However, the fuel supply regulation is not automatic, which in most cases is an extreme necessity. Therefore, in places where only solid fuel (coal, wood) may be used, it is necessary to use KChM type industrial boilers, as well as standard brick furnaces of various size, in t. ch [expansion unknown] and for the purpose of heating water, preparing food and heating.

An important measure directed toward project development and improvement is experimental construction. As early as 1968, the decision was made that in each oblast (kray, ASSR) there will be one or two experimental-model settlements built which will meet 15-20-year long-range requirements.

Good examples in this regard have been set by the Moscow, Saratov, and Sverdlovsk Oblasts, Krasnoyar Kray, the Tatar and Mari ASSR, and a number of others.

The construction of the General'skoye and Pushkinskiy settlements in Saratov Oblast, of the Baltym and Patrushi settlements in Sverdlovsk Oblast, of Bol'shoye Teleshevo and Nara settlements in Moscow Oblast, and others has become an important landmark on the road to reorganization of the village. It has served as a shining example, when the joint, friendly work of customers, planners and builders makes it possible to solve complex problems at an acceptable architectural level with high quality and in a short time.

As a result of the goal-oriented work performed by our leading project planning institutes, in recent years and aside from projects for residential housing, a rather complete nomenclature of standard and re-usable projects for buildings of cultural-domestic function has been developed for rural areas.

However, we must note that almost all these projects are intended for application in relatively large settlements which have, as a rule, a population of no less than 500 residents.

At the present time, in the period of solving the problem of improving cultural-domestic service to residents of all preserved villages, the need has arisen for developing projects for small capacity public function institution.

One of the possible means of realizing this task is the construction of small public function institutions blocked together or joined with a residential house. Thus, the Mosgipronisels'troy Institute has developed projects for a work brigade house blocked together with a public bath, a garret type residential house with kindergarten for 12 pupils on the first floor, and the same type of house with a medical station on the first floor or with a tearoom and store, also on the first floor. Construction is presently being performed in

a number of villages in Moscow Oblast according to these projects. However, the advantages and disadvantages of such combination of residential houses with institutions of public function will become apparent in the course of their long-term operation. Therefore, the application of the indicated projects may have a limited experimental character for the time being.

One of the basic directions in planning and construction in rural areas must be the implementation of integrated building, i.e., building agricultural production facilities, residential and public buildings, installation of technical equipment and amenities according to a unified general plan. The experience of the best settlements shows that integrated construction may be achieved only as a result of the joint efforts of customers, planners, builders, as well as the soviet organs organizing and directing this work. At the present time in the Russian Federation, integrated construction has been introduced at a large number of villages, which in many ways serve as models.

Construction and improvement of developed settlements -- production centers -- must undergo further development. Also living conditions in preserved populated areas -- remote villages -- must also be improved, with performance of repair on existing buildings, renovation of fences and wells, installation of accessways, paths, sidewalks, additional construction of single-story houses on presently vacant lots which were former homestead sites, and construction of small capacity institutions for social, cultural and domestic service.

Thus, the task is to renew all rural settlements. This, in turn, must facilitate the securement of the work force employed at small farms, of which there are still many in remote villages.

Patron organizations must be attracted to the performance of this work. These must be presented annually with specific tasks on the social restructuring of farms and villages.

Unwaning attention must be given to the development of individual and cooperative construction of residential houses. This is dictated by the shortage of funds on the whole for the development of the entire rural infrastructure, as well as by the need for increasing the attention and responsibility of residents for housing and its normal use.

Significant importance is given to obtaining additional agricultural production from the subsidiary plots of rural residents. This must be an important contribution to the solution of the Food Program.

The implementation of individual and cooperative construction to a significant degree facilitates securing the work force on the farm, which at present is a task of primary importance, particularly for the oblasts of the RSFSR non-chernozem zone. A good spacious house with subsidiary plot, domestic buildings, and various poultry firmly ties rural residents to the land, to their native sovkhoz or kolkhoz, and teaches them from childhood a respect for peasant labor.



Stimulation of individual and cooperative construction in rural areas should rightfully also be viewed from the standpoint of demographic policy. Sociological studies tell us that in rural areas the relative share of families with many children living in individual houses is higher than in sectional multi-apartment units. The peculiarity of the individual house and land plot consists, in particular, of the fact that with growth of the family it is also possible to expand the residential house due to room additions, garrets, verandas, etc. This is one of the factors determining the relation of the family to its make-up and number of children.

The provision for further development of these types of construction presents a number of tasks for the gosstroysof autonomous republics, the kray and oblast architectural services and project planning organizations.

It is necessary to develop and introduce into operation a simple and clear order for formulating initial and project documentation which gives individual builders and rural ZhSK [residential construction cooperatives] the "green light" all the way, starting from the apportionment of a land plot to operational acceptance of the completed facilities.

Projects for farmstead houses intended for individual builders and rural ZhSK must provide an increased level of living comfort by means of spacious kitchens, living rooms, verandas, storerooms, and pantries. More attention should be given to questions of increasing the architectural-artistic expressiveness of the houses and developing variants for decorative elements in facades. This will make it possible to obtain varied external appearance of the same plans.

All that has been done: the general plan, the individual projects and the conditions of building and financing the house -- must become the property of the village residents and undergo goal-oriented discussion at the stage of general plan ratification. It is specifically in this period that the size of the populated area is decided, questions of land plots near the house or farmstead are resolved, size of grazing lands determined, etc.

We cannot keep silent about the quality of the projects. The quality of project planning is not only a technical problem, but also a social, moral, and educational one as well. The efficiency and creative activity of all members of the collective is a necessary condition for the successful work of project planning institutes. In order for each colleague to work with full output and without allowing any miscalculations, the party, professional union and komsomol committees and institute administrations must decisively increase their standards set for the work force, create an atmosphere of creativity and mutual responsibility in the collectives, and intensify their political education work with the people. This work must be based on good organization of labor and improvement in the forms of material and moral incentives. Creative discussions with specialists should be presented more often, and there are more than enough topical issues to be dealt with at every institute.

There are three parties participating in the construction of facilities in rural areas: customers, planners and builders. If we speak with each of these,

they will surely express pretensions about each other. Builders complain of delays in blueprints, the customer complains of the obstinacy of the contractor. Planners, in turn, voice their complaints about the customer. Give him a free hand, they say, and he will express his opinions as to how the facility should be almost to its very completion.

Evidently, this is something which cannot be avoided. Life is life, with all its complexities. However, the participants in construction must overcome any difficulties which might arise together. Nevertheless, there is often no such agreement between the customers, planners and contractors. As a result, a huge amount of ready project-estimate documentation is not used in rural construction, and "placed on the shelf" of the customers. And so it is every year. However, it is a strange matter: hardly anyone notices the needlessly wasted money and the labor expended by many thousands of specialists.

Much needs to be done to reduce the project planning times, since the existing state of affairs is not satisfactory either to the planners to themselves or to the customers. However, it is the sovkhozes and kolkhozes which suffer the most from this. A reduction in planning time would be facilitated by more precise and timely planning of project-survey work, particularly the transition to two and three-year planning. This vitally important question has repeatedly been discussed at various conferences and seminars, but each time its solution is for some reason put off. As a result, planners often do not have a firm topical plan even for the current year.

The network of project design organizations which has arisen also does not meet the needs of the times. As before, there is much parallelism in their work. And, after all, how could it be otherwise if in every oblast or kray there are three or four institutes engaged in planning for rural areas, as well as institute branches, design bureaus and offices.

The successful solution of the problems which we have touched upon will greatly facilitate and improve the work of restructuring rural areas. By responsibly and critically addressing that which has been achieved, planners must seriously consider the nature of many of their shortcomings and take effective and immediate measures for eliminating them.

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## AGRICULTURAL CONSTRUCTION

### ROLE OF RESEARCH INSTITUTE IN RURAL CONSTRUCTION DISCUSSED

Moscow IZVESTIYA in Russian 17 Jan 84 p 2

[Article by V. Pleshavanya, Moscow: "A Ruble Taken, A Five Kopeck Piece Returned"]

[Text] From a meeting of the USSR People's Control Committee.

During the meeting, the committee's chairman asked the following question of the director of TsNIIEPgrazhdansel'stroy [Central Scientific Research Institute of Experimental Planning for Rural Construction] B. Makhan'ko:

"How can you explain the fact that the institute has still not become a leading planning and scientific research organization in the area of standard planning and in the construction of rural populated points?"

This question came as no surprise to the director and yet for all practical purposes he had no suitable response.

"As the director, I am guilty. I should have been more demanding of my subordinates."

"But why only of your subordinates?" asked a member of the committee, "First of all, you should have been more demanding of yourself with regard to restoring order at the institute."

And by no means could operations at the institute be considered satisfactory. An inspection carried out by the USSR People's Control Committee uncovered serious shortcomings in the work of the institute. Over a period of many years, TsNIIEPgrazhdansel'stroy had been unable to establish business-like contacts with the republic and oblast planning organizations and in many instances it was duplicating their work. The institute is not summarizing the experience being accumulated in planning and experimental construction and it is not studying the requirements of the population, kolkhozes, sovkhozes and other agricultural enterprises for efficient plans for dwellings and cultural-domestic installations. And the work being produced at the institute is not innovative in nature and thus is not being employed on an extensive scale. Here is a specific example: of 136 standard plans for dwellings created within the walls of TsNIIEPgrazhdansel'stroy during the 10th Five-Year Plan, only 16 were actually used in construction.

The situation with regard to the introduction into operations of experimental plans is even worse -- only three of 65 are being used. And for all practical purposes this implies that three planning workshops consisting of 230 workers are wasting hundreds of thousands of rubles worth of state resources annually. Mountains of various types of documentation are accumulating and gathering dust on shelves, documentation for which the builders have no need.

Instead of furnishing effective assistance in rebuilding the rural areas, the institute's leaders are diverting considerable scientific resources for the purpose of carrying out the orders of various municipal organizations. Each year, based upon economic agreements, the plans call for the preparation of planning documentation for outside clients in the amount of 200,000-400,000 rubles. For example, the institute prepared drawings for a hotel for petroleum-chemists in the city of Tobolsk, dwellings for sailors at Izmail and for food industry workers in the city of Uglich and so forth.

At the same time, the institute's scientific plans and programs lack the themes and work associated with the planning and building of villages, with the relationship between the housing and production zones being taken into account. These plans and programs do not point out the anticipated economic effectiveness of the scientific works or the social effect expected, nor do they assign executive responsibility.

The chief concern in any endeavor is the final result and this is particularly true with regard to science. And if we evaluate the work of the institute over the past few years, then surely we are surprised to say the least. Judge for yourself: in 1976 the economic effect per ruble of expenditure was 2.42 rubles, in 1977 -- 1.48 rubles, in 1980 -- 0.32 rubles and in 1982 -- only 5 kopecks.

What is the principal reason for this? This problem was discussed during the committee's meeting. Special concern was evidenced over the fact that at TsNIIEPgrazhdanstroy proper attention is not being given to the planning for scientific research work or to exercising control over the carrying out of such work. Moreover, the working programs are being approved with no analysis of their final effectiveness. Hence this explains all of the problems that develop. The institute's plans are overloaded with numerous tasks of Gosgrazhdanstroy and other organizations. Moreover, these tasks are not scientific in nature and tens of thousands of rubles are being expended annually for carrying them out.

The inspection revealed crude violations of state-financial discipline and illegal payments of state funds. Director B. Makhan'ko was very generous in issuing awards to those who had not earned them. In particular, he "honored" the administrative personnel, whose ranks were inflated owing to the staffs of production subunits.

The director displayed a considerable amount of inventiveness in the interest of improving the administrative staff. New departments, sectors and groups were created within the institute's structure. The number of chiefs increased rapidly, while at the same time the number of rank and file workers decreased. For example, there were 14 leaders in the Engineering Equipment Department



which consisted of 60 individuals. Nor was there a proper ratio between the senior and junior specialists, with the institute having 167 of the former and 90 of the latter. Raised wages were paid out unjustifiably to 82 senior specialists and 14 senior scientific workers. Economists requiring higher salaries were retained instead of bookkeepers.

The squandering of state resources continued in the form of other items and channels. Many individuals at the institute, aware of the generous nature of Boris Aleksandrovich Makhan'ko, succeeded in obtaining from him benefits which exceeded their wildest dreams. Included among them was the deputy director for economic (yes, economic!) matters T. Ivanov. A bonus was added to his basic salary and a considerable one at that -- 80 rubles. This same list of bonus-holders, as they are referred to at the institute, included the head of the Planning Department, the drivers of specialized motor vehicles comrades Kislyakov, Koryagin, Kapustin and others. This list could go on an on.

Nor can we overlook the award fund. No importance was attached to whether or not the plans and tasks were fulfilled or who worked and what they accomplished. Here another principle was employed: emphasis was placed upon not offending anyone. For example, let us say that Planning Workshop No. 6 fulfilled its plan by only 72 percent. Nevertheless, it would be paid an award in the amount of 1,500 rubles. An award was issued to the Department for the Preparation of Planning Documentation, which underfulfilled its plan by 25 percent.

"What was your problem Boris Aleksandrovich?" the director was asked during the committee's meeting, "Is it really possible that you were unaware that all of this was illegal?"

And what answer could he give. There was nothing to say.

It bears mentioning that during the course of the inspection and prior to the problem being discussed in the USSR People's Control Committee, the leadership of the institute had to reexamine the structure of a number of departments, enlarged sectors numbering from 16 to 24 persons were created, small brigades were abolished, the official schedule for workshops Nos. 1 and 2 was revised, ten vacant positions were eliminated and the illegal issuing of bonuses was terminated.

The institute is subordinate to Gosgrazhdanstroy and thus during the committee meeting questions were addressed to the deputy chairman of Gosgrazhdanstroy L. Vavakin. He was forced to admit his guilt with regard to the unfavorable situation at the institute. Comrade Vavakin and his staff are not providing satisfactory management for or control over the work of the institute.

Moreover, it turned out that in addition to Comrade Vavakin the institute has seven other bosses, that is, it is subordinate to seven different administrations of this same Gosgrazhdanstroy. Moreover, none of these are seriously interested in the work of the institute, in the formation of draft plans and scientific research works or in the effectiveness of the results of studies. They have tolerated a lack of control over the institute's expenditures of state resources. At the same time, all seven of the administrations have burdened the institute with numerous tasks of a non-scientific nature and they have included in its plans large volumes of work not related to its principal

operations. Thus one is reminded of the popular proverb: too many cooks spoil the broth.

The USSR People's Control Committee reprimanded the director of the TsNIIEPgrazhdansel'stroy Institute B. Makhan'ko and also exacted a monetary fine from him. The deputy chairman of Gosgrazhdanstroy L. Vavakin was also reprimanded. Consideration was given to his statement that Gosgrazhdanstroy will examine the materials of the inspection, conducted by the USSR KNK /People's Control Committee/, and undertake measures aimed at correcting the shortcomings uncovered in the work of the institute.

I would like to end the report on this meeting by quoting the statement made by a member of the committee and chairman of the Moscow Kolkhoz imeni M. Gor'kiy, Hero of Socialist Labor V. Isayev. Turning to the leaders of the institute, he stated:

"Dear comrades, you must visit the villages more frequently. Come to our kolkhoz, since we are not too distant, and see how we are building social-cultural installations and experiencing difficulties, despite the fact that we lack good plans. And rely more boldly upon the leading experience accumulated at the kolkhozes and sovkhoses. Then together we can correct the problems more rapidly."

These words are correct and they evidence concern for strengthening the link between science and practical work. And there is a special requirement for this at the present time, as emphasized during the December (1983) Plenum of the CPSU Central Committee.

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## AGRICULTURAL CONSTRUCTION

### NEW DIRECTIONS IN AGRICULTURAL CONSTRUCTION DETAILED

Moscow *PLANOVOYE KHOZYAYSTVO* in Russian No 2, Feb 84 pp 74-78

[Article by V. Borovikov and Yu. T. Ipygin: "Problems of Raising the Efficiency of Capital Construction in Agriculture" ]

[Text] The USSR provision program for the period of up to 1990, approved by the May (1982) Plenary Session of the CPSU Central Committee, being a working document for the further development of agriculture envisions the reliable provision of various food products as soon as possible to the people of the country.

This program is directed toward the development of a single agricultural industrial complex. In the 11th Five-Year Plan period, 233 billion rubles are allotted to strengthen the material equipment base of the agricultural industrial complex, while in the 12th Five-Year Plan period, about a third of the total capital investments in the national economy will be for this purpose.

For a very near future, a large program is outlined for building enterprises to store and process grain, fodder production, animal husbandry complexes, vegetable storage, greenhouse-hotbed structures and mineral fertilizer warehouses. In the 11th and 12th Five-Year Plan periods, about 160 billion rubles will be directed toward building housing, schools, hospitals, roads and other facilities in rural areas.

Construction sites for the agricultural industrial complex make up 40 percent of total of new starts of large facilities in the capital construction plans for 1983. This construction program is being implemented by agricultural builders without increasing the number of workers, i.e., by raising the productivity of labor.

USSR *Minsel'stroy* [Ministry of Agricultural Construction] , the primary general contractor in agriculture, does contract construction-installation work to an amount of 5 billion rubles annually and plans to increase such work to 7 billion rubles in the very near future. The ministry is increasing the capacities of construction organizations, improving the existing enterprises and putting into operation new enterprises in its own production base. The total fixed production capital in industry and construction of the ministry increased by 50 percent in the 10th Five-Year Plan period.

The USSR Minsel'stroy has modern enterprises to produce precast three-layer reinforced concrete structures with light-weight insulation in the following cities: Novosibirsk, Soldato-Aleksandrovsik, Mirgorod, Slutsk and Kapchatay (with a capacity of 66,000m<sup>3</sup> structures each annually); mechanized and automated units for manufacturing ready-mixed concrete and mortar, as well as products from large-size asbestos-cement sheets; enterprises for manufacturing bonded wood structures, joiner's products and for repaving road construction machines and devices.

This makes it possible for the ministry to build modern elevators, granaries, poultry plants, mixed feed plants, large animal husbandry facilities for producing milk, beef and pork, enterprises for repairing agricultural equipment and housing and cultural-personal service buildings in rural areas. Many of the facilities are put into action on schedule or ahead of schedule.

The acceleration of construction depends primarily on incorporating most rapidly the achievements of scientific technological progress and implementing the decree of the CPSU Central Committee and the USSR Council of Ministers "On strengthening the work on the saving and efficient utilization of raw materials, fuel-power and other national resources." Thus, a high-speed method was introduced at the Chernigov Grinding Combine for the installation of large-unit equipment that made it possible to reduce the installation time to a third of the previous time. The installation of technological equipment was accelerated by the clear-cut organization work of the Ukrelevatormel'montazh Trust, the subcontractors and the timely delivery of structural metal in consolidated units in containers to the facilities.

With the operation of the Korostyshevsk Agricultural Construction Combine in the Minsel'stroy of the Ukraine SSR a base was produced for manufacturing bonded wood structures used in various agricultural production buildings such as: poultry houses, rabbit hutches and mineral fertilizer warehouses, instead of reinforced concrete ones. This made it possible to reduce labor-intensiveness and the building time of poultry houses, for example, to half; reduce their weight to 1/2.5, reduce the consumption of metal sharply; and raise the operating characteristics. The use of modern designs for animal husbandry buildings makes it possible to reduce the cost of one cattle stall by 10 to 27 percent and reduce metal consumption by 107 tons and cement consumption by 283 tons for all facilities where such structures are used.

The use of complete sets of structural metal lighter than reinforced concrete for building poultry plants and tea factories made it possible to reduce the weight of a building to a third and also reduce the size of the foundation. However, the technical administration of the USSR Minsel'stroy does not, in our opinion, generalize the advanced experience and achievements of the republics sufficiently and introduces the most efficient structural designs too slowly, orienting the development of the construction industry toward the most expensive and heavy products.

The basic structural materials in the USSR Minsel'stroy are precast reinforced concrete, in situ concrete and reinforced concrete; wall materials -- primarily brick. The annual volume of precast reinforced concrete and concrete used



by the ministry to build agricultural facilities is 9.6 million  $m^3$ , including 1 million  $m^3$  of wall panels, 2.5 million  $m^3$  in situ concrete and reinforced concrete and 3.2 million  $m^3$  of brickwork. About a quarter of the precast reinforced concrete and three-quarters of brick are used to build walls. Precast reinforced concrete is considerably more expensive than the in situ concrete and more labor intensive, since the cost is determined by the amount of live and reified labor spent. Moreover, precast reinforced concrete structures use 20 to 25 percent more metal and 30 percent more concrete than in situ reinforced concrete.

Considerable progress has been achieved in recent years in constructing buildings and structures of in situ reinforced concrete. The use of adjustable and sliding concrete forms, concrete pumps, plasticizers and the development of new designs, including those in the shape of thin spherical shells (cupolas), made it possible to increase the efficiency of construction sharply when using in situ reinforced concrete as follows: shortened construction time, reduced its material consumption and cost and raised the productivity of labor of construction workers. Thus, in the Glavmosinzstroy at the Moscow Gorispolkom, when building facilities with in situ reinforced concrete using truck-mounted concrete pumps, the average output per shift per worker is  $12.4m^3$  of structures; when using precast reinforced concrete --  $2.5m^3$ ; and the best brigades --  $4.65m^3$ . However, this does not take into account labor expenditures for manufacturing reinforced concrete products at the plant -- 11.4 hours per  $lm^3$ .

The most efficient designs for agricultural facilities are spherical shells (cupolas) made of in situ reinforced concrete using pneumatic concrete forms made of special rubber impregnated cloth produced by the Angren "Rezinotekhnika" Plant. In 1981, the Mosoblostroy No 9 Trust, using the design by the Mosgrazhdanproyekt, made the roof of the warehouse building of the Construction Installation Administration No 3 of this trust in the shape of a spherical shell 12 meters in diameter. The entire concreting process took 8 hours. Covering such an area with plates of precast reinforced concrete would require much more time and materials. The removal of relatively inexpensive pneumatic forms took two days after the completion of the concreting. The estimated cost of such a dome was 60 rubles per  $lm^2$  of roof. It is sound practice to use this design to build repair shops with areas of up to  $1000m^2$  for agricultural machinery of sovkhozes and kolkhozes, grain warehouses, fertilizers, etc.

In 1982, the Scientific Research Institute of Foundations and Underground Structures imeni N. M. Gersevanov of the USSR Gostroy developed an efficient design of shallow foundations for small agricultural buildings of two types -- columnar and belt, made from in situ concrete or reinforced concrete which, as compared to precast reinforced concrete, reduces the weight and estimated cost of foundations to a third with a sharp improvement in the rest of the indicators.

One of the basic problems faced by agricultural builders is the acceleration of the construction of housing and cultural-personal service facilities for rural workers. The USSR Minsel'stroi was instructed to double housing construction in rural areas in the 11th Five-Year Plan period, with half of it being of the farmstead type with outdoor facilities for personal auxiliary farming. At present, only one tenth of such housing has been built by the ministry.

The USSR Minsel'stroi annually completes housing with a total area of about 6 million  $m^2$ , including those made of brick -- about 4 million  $m^2$ , and of large panel and modular type -- 1.8 million  $m^2$ . The share of brick homes for the ministry as a whole is 67 percent of the annual total, while in the UkSSR Minsel'stroi this indicator is 79.2 percent. In the union republics, housing is also built basically with brick since this does not require the use of tower cranes and panel carriers, and good access roads to the housing are not indispensable in rural areas.

To complete more housing in the rural areas in the 11th Five-Year Plan period, it is necessary to find reserves of construction materials and labor resources with minimal expenditures of forces and money. In individual cases, this is achieved by organizational measures such as, for example, in the Rostov Oblast where local planning organs posed before each sovkhoz and kolkhoz the problem of building five houses a year using their own workers in the period between seasons. On this basis, in 1982-1983, 500,000 $m^2$  of housing was completed each year in the rural area of the oblast. At present, there is a technical method that makes it possible by using the same amount of bricks, to build four rural houses instead of three by using a lightened method of brickwork.

At the start of 1983, the All Union Scientific Research Institute of Construction Information of the USSR Gostroi issued a catalogue of data sheets on scientific technological achievements, recommended in construction, citing lightened external brick walls. The basic design solution of lightened walls is the use of two brick walls made of half bricks (12cm), with the space between them filled with vitreous, mineral wool plates or other insulation, including backfilling with light-weight concrete aggregate gravel. The tie between both layers of brickwork is provided by vertical transverse walls half a brick thick with the distance between them not exceeding 1.2 meters. Lightened brickwork may be used for outer load-carrying walls and nonload-carrying walls of buildings up to five stories high and nonload-carrying walls of buildings up to nine stores high. Several five-story houses built in the Moscow Oblast in 1980 used the lightened brickwork method. Comparing the costs of outer walls with lightened brickwork with costs of brick walls with solid brickwork 64cm thick, we find as follows: estimated costs are 9.75 and 17.35 rubles respectively or, in the first case 1/1.78 times lower; labor -- 0.3 and 0.5 man-days, or 1/1.67 times lower; steel consumption -- 1.4 and 2.2 kg, cement -- 9 and 22kg, bricks 102 and 250 pieces; the weight of the walls decreases 1/2.45 times per  $lm^3$ , the cost of the house as a whole is reduced by 20 percent.

According to construction norms and regulations (SNiP-II-22-81) approved by the USSR Gosstroy, outer walls must be built primarily using hollow blocks and lightened brickwork. However, this regulation is not observed either by designers or builders and is not monitored by the Gosgrazhdanstroy because typical housing and agricultural building designs do not specify the use of the lightened brickwork in the wall design.

At the start of 1983, the Gosgrazhdanstroy and the RSFSR Gosstroy analyzed 1200 plans of houses and 400 plans of cultural-personal service buildings in rural areas and legalized a list of plans for state, cooperative and individual construction. On the average for the kray, oblast and autonomous republic, this list includes 25 to 30 types of buildings but it does not contain the indicated type of housing with lightened brickwork of the farmstead type, although the Gosgrazhdanstroy recommended the lightened brickwork with insulation for use in construction.

In our opinion, the work on selecting housing plans for the rural area has not been completed inasmuch as the number of building types in the list is too large, and it is advisable that the Gosgrazhdanstroy reduce it sharply, leaving only the most economical ones. In Litovskaya SSR, for example, four types of rural housing of the farmstead type were used -- two brick and two wooden with various modifications and this was entirely sufficient.

The use of lightened brickwork, the expansion of production of hollow brick and its more efficient utilization in industrial production will make it possible to expand brick deliveries for rural construction. At present, 125 million m<sup>3</sup> of brickwork are being erected in the country annually at a cost of 5 billion rubles using about 50 billion bricks. Of these, only 20 percent are used for housing. A considerable part of this construction material is used to build walls of unheated buildings (garages, warehouses, transformer substations, etc.), buildings with surplus heat (boiler rooms, forge-press and rolling shops) and fences, where brick's high heat, hydraulic and sound insulating properties are not required. Brick is used widely for internal partitions between industrial and administrative buildings, etc. where it could be easily replaced by other materials.

The use of gypsum board and gypsum fiber plates for partitions and inside finishing of walls makes it possible to reduce material consumption and labor sharply as compared to partitions made of small-size materials and reinforced concrete; the partition weight is reduced to a fifth. In our opinion, republics, krayispolkoms and oblispolkoms that distribute small-size wall materials should reduce the allotment of brick to customers and contractors in cities and transfer the freed stock to rural builders.

The 11th Five-Year Plan specifies tasks on increasing the construction of modern plants for building structural brick and expanding its output, so that in the future it will be possible to build farmstead type housing with brick.

The use of concrete blocks for building rural facilities appears promising. Thus, in the Vladimir Oblast, concrete blocks are being used widely in building animal husbandry buildings. In Saratov Oblast, concrete blocks are given the proper coloring and they are used widely to build single-apartment houses of the farmstead type in rural areas. The advantages of this material are primarily the saving of metal and cement and its low cost. While 50kg of steel and over 400kg of cement per  $\text{lm}^3$  of product are used for concrete panels, no metal at all is used for concrete block walls and cement consumption does not exceed 130 to 140kg for the same area, i.e., only a third of that spent for solid walls, since the concrete blocks are 70 percent hollow. The cost of  $\text{lm}^2$  of wall made with concrete blocks is about 10 rubles as compared to 17 rubles 35 kopecks for Keramzit-concrete panels.

However, the USSR Minsel'sstroy as general contractor does not show interest in using economical materials that would reduce the cost of construction and material consumption because a reduction in the cost of material reduces the general indicator of the volume of construction-installation work. This question requires a decision on the part of the USSR Gosstroy the USSR Gosplan, the GKNT [State Committee of the USSR Council of Ministers on Science and Technology], the USSR Minsel'khoz [Ministry of Agriculture] and the USSR Minsel'sstroy.

There are also solutions on the further development of plant production of wooden panel houses and sets of wooden parts for houses with walls made from local materials that envisions a sharp acceleration in construction in rural areas, and are called upon to reduce the labor-intensiveness of work and related costs of construction.

However, the USSR Gosstroy pays insufficient attention to the development of production and the incorporation of the indicated types of structures and materials, turning its attention basically to introducing into the construction practice of the USSR Minsel'sstroy and basic general contractors ministries precast reinforced concrete that increases the cost of construction.

The indicator of construction with prefabricated parts or modules, as it is being used by the USSR Gosstroy, distorts the concept of the level of construction industrialization. This indicator is determined by the ratio of the cost of the prefabricated parts to the total cost of all parts in the building. It is 60 percent for large-panel reinforced concrete houses, while the USSR Gosstroy defines construction with prefabricated parts or modules as 100 percent. For brick houses, the ratio of prefabricated parts to the cost of all parts in the building is somewhat lower and is about 50 percent. However, the USSR Gosstroy assumes this indicator for brick houses as zero.

The indicator of construction of building with prefabricated parts or modules orients the development base of construction organizations to priority construction using more expensive reinforced concrete panels, since construction using in situ concrete, bricks and wood is not considered industrial. In connection with this, the Technical Administrations of the USSR Minsel'sstroy and the kolkhozstroy associations of the union republics



plan to replace in situ reinforced concrete and bricks with large-panel reinforced concrete structures. If such a technical policy is implemented, it would require the elimination of 75 percent of the existing capacities for the production of wall materials, basically brick. Instead, it is proposed to develop additional capacities to produce precast reinforced concrete which will require over 500 million rubles of capital investments without an actual increase in the capacities of construction organizations in rural areas. This is also substantiated by the fact that in 1975 to 1982 the USSR Minsel'stroy increased the capacity for producing precast reinforced concrete by over 4,000,000 m<sup>3</sup> without an increase in the volume of construction-installation work. The utilization of capacities for producing precast reinforced concrete decreased during this period by 13 percent. Taking this into account, it is expedient, in our opinion, to drop the indicator of construction with prefabricated parts or modules, and stop building reinforced concrete large-panel housebuilding (KPD) plants for rural construction in the systems of the USSR Minsel'stroy and kolkhozstroy associations (the utilization of existing KPD plants in these organizations averages 60 percent).

The USSR Gosstroy, the Gosgrazhdanstroy, the USSR Minsel'khoz, the USSR Minsel'stroy and the kolkhozstroy associations of union republics should develop a construction base in the rural area that would make it possible to utilize the following progressive construction materials: in situ concrete structures, lightened brickwork, bonded wood structures, light metal structures supplied complete with efficient insulation, etc.

To raise the efficiency of capital construction in rural areas, it is necessary to develop all types of the most modern designs. However, scientific work on developing and improving designs is considered practically completed by the scientific research organizations of the USSR Minsel'stroy, the USSR Minsel'khoz and the USSR Gosstroy when a new technical solution is introduced at least in one construction facility. In our opinion, it is necessary to utilize it in building not less than three enterprises in each republic and only then consider the work finished.

The plan for experimental construction of the USSR Gosstroy is, in our opinion, oversaturated with research on using large-panel and large-module precast reinforced concrete structures and only an insignificant part of the work is dedicated to other types of design. For many years, the same work subjects pass from plan to plan. Their completion time is stretched out and many years pass before new technical solutions are introduced in the plans.

The work efficiency of collectives of the Central Scientific Research Institute of Experimental Planning (TsNIIEPsel'stroy) of the USSR Minsel'stroy, the giprosel'khozstroy of the gosstroy of the union republics and organizations of the USSR Minsel'khoz on incorporating efficient solutions is not high enough. Catalogues of records of scientific-technological achievements, recommended for use in construction, are of an informational nature. Moreover, a small number is printed and do not reach a wide group of designers in the ministries. The problems of organizing the mass production of new designs are solved inefficiently. At present, customer ministries have broad powers:

they develop and approve practically all plans, orienting on construction designs produced by contractor ministries.

Plans for building enterprises show the old familiar designs and the bases of construction organizations are not being modernized sufficiently, since new designs are not utilized in plans. Thus, there is a delay in the introduction of new cementless superlight construction material-ganzhaporit. Products made of this do not require the use of reinforcing steel. For the first time in domestic and foreign practice, there was developed by the USSR Minpromstroy [Ministry of Industrial Construction] the use of waste slurries of the Kirovobad Aluminum Plant imeni 50-letiya of the USSR. The characteristics of this material exceed all GOST indicators for reinforced concrete. The Ganzhaporit is very promising for use in rural construction.

To accelerate construction of rural agricultural enterprises, housing and cultural-personal service facilities, it is necessary to introduce widely progressive structural designs that reduce the amount of construction materials and lighten the weight of the buildings, and improve the construction technology by using advanced construction methods. To this must be directed the efforts of customer ministries, the USSR Minsel'khoz and other contractor ministries, especially, the USSR Minsel'stroy, the kolkhozstroy associations of union republics, their planning, design and scientific research organizations, as well as of the USSR Gosstroy that is responsible for the technical policy in construction.

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## MORE EFFECTIVE METHODS FOR RURAL CONSTRUCTION

Moscow SEL'SKOYE STROITEL'STVO in Russian No 1, Jan 84 pp 1-2

[Article by G. Klochkov, scientific secretary of the Technical-Economic Council, RSFSR Minsel'stroy [Ministry of Rural Construction]: "Foremost Experience and Achievements in Science and Technology Introduced Into Rural Construction"]

[Text] The resolution of the party and the government entitled "On Measures for Accelerating Scientific-Technical Progress in the National Economy" notes that, in accordance with the course for intensification of social production worked out by the 25th and 26th CPSU Congresses, there has been a significant increase in the scope of application of achievements in science and technology and of foremost experience in the national economy.

In implementing the course of industrialization of rural construction, the ministry is aiming the efforts of its organizations toward strengthening and improving their own production base. Particular attention is being given to increasing full prefabrication of construction. In 1982 it reached 61 percent. In elevator construction it was 82 percent, and in rural production construction it was 78 percent.

Effective measures are being taken which make it possible to steadily increase the level of full prefabrication of construction for farmstead houses with household accommodations, animal husbandry complexes, poultry farms, transformer substations, purification structures, as well as schools, culture houses, and domestic service enterprises.

The ministry possesses sufficient capacities for the production of prefabricated reinforced concrete -- over seven million cubic meters -- with prospects of expanding these capacities by means of reconstruction and technical retooling of the enterprises. The task consists of utilizing these capacities more fully and ensuring complete set delivery of high quality parts and structures having a high level of plant readiness and not requiring additional work at the construction sites.

For these purposes, 20 enterprises have mastered the production of acoustic uniform covering slabs with a surface prepared for ruberoid adhesion, whose production volume has reached 200,000 square meters annually. Many plants have organized the output of integrated roofing slabs with insulation and one

layer of soft roofing material. Up to two million square meters of such slabs are produced annually. The production of prefabricated and modular restroom facilities has been perfected (up to 20,000 units per year). Outside wall panels are manufactured with built-in joinery and sheet iron casting.

The construction of farmstead houses -- single and double story with split-level apartments -- is expanding in the Russian Federation. To increase their degree of prefabrication, the Design Bureau on Reinforced Concrete of the RSFSR Gosstroy [State Committee for Construction Affairs] has worked out a standard project design which provides for the application of lightweight reinforced concrete roof and veranda parts.

The Minsel'stroy, together with the Minsel'khoz [Ministry of Agriculture], Gosstroy, Glavsel'stroyproyekt [Planning of Rural Buildings and Structures Main Administration] and other planning and scientific-research organizations, has prepared and implemented a program of planning and construction of auxiliary buildings and structures for animal husbandry complexes using industrial structures, fully prefabricated tambours and sides of agricultural buildings, floors, channels, dairy areaways, and feeding troughs. These measures reduce the labor expenditures by 18 percent at the construction site.

The industrialization of construction of engineering structures is also being implemented (prefabricated electrical substations, boiler rooms planned for overall-block installation, compact purification structures with low pressure aeration and application of high pressure ventilators instead of the air blowers which are in short supply, prefabricated water pressure towers, sewer pumping installations made of large-scale prefabricated elements).

The "Novosibirskobl'sel'stroy" Administration has introduced an effective solution for the construction of silo trenches at animal husbandry complexes. Reinforced concrete slabs are suspended from piles which are driven in at a slight angle. All the work is fully mechanized and may be performed at any time of the year.

At most of the organizations of the TSFSR Minsel'stroy, enterprises have been created for the production of lightweight fillers for concrete (primarily keramzit gravel) based on the use of local raw material. This ensures the widespread introduction of lightweight concrete load-bearing and enclosure structures into construction, with their volume reaching 1.2 m<sup>3</sup>. Enterprises for the manufacture of wood laminate structures have been built and are currently in operation: the Nelidovskiy Plant in Kalinin Oblast', the Vel'skiy Plant in Arkhangelsk Oblast, in Vologda, at the Cheborsary Experimental Wood Processing Plant, at the Lapshangskiy Timber Management in Gorky Oblast, at the Ugranskiy Wood Processing Plant in Smolensk Oblast, and at the production enterprises combine at st. Dinskaya in Krasnodar Kray. The first three enterprises are intended for the production of straight and curvilinear load-bearing structures of 10,000 cubic meters and enclosure structures of 200,000 square meters each.

Also, the Vologda shop produces 14,000 cubic meters of wood-splint slabs for inside walls and floors. The production of board parquet flooring using by-products from lumber processing and birchwood has been introduced. Such shops



have been built at the "Orelsel'stroy" Trust and in the "Voronezhobl'stroy" Administration. Lightweight structures using flat asbestos cement sheets, light metallic structures, rolled sheeting, arbolite, and extruded asbestos cement slabs for walls and roofs are being introduced.

The second factor in the growth of labor productivity is the mechanization of labor consumptive work. At the present time, 5,500 bulldozers, 6,900 mobile cranes and 2,300 tower cranes are in operation at our enterprises within our ministry. 1,700 full complements for means of minor mechanization, instruments and attachments for the mechanized production of plastering work (plastering stations) have been manufactured and delivered to the construction organizations. Of these, 1,532 are in operation at the construction sites. Worker output using the mechanized method (slurry feed with a mortar pump, jet nozzle surface plaster application, concrete floatwork machines) is, as a rule, two times higher than with manual labor. 600 painting work stations have been delivered for the mechanization of painting work. Their application sharply increases the work productivity of painters.

The centralized preparation of roofing mastics and the mechanized method of work production for soft roofing materials serve the same ends. In this case, only 1/5 or 1/6 of the amount of bitumen will be used. Positive results have been obtained from the introduction of fusible ruberoid. The overall number of standard complements for roofing work comprises 245, with 218 of these in operational condition.

Rural construction and house building combines play an important role in rural construction. The progressiveness of such enterprises is expressed in the fact that industrial enterprises manufacturing parts and structures, construction, mechanisms and technological transport are all under centralized control. All the links in the construction chain work toward the end product -- the operational introduction of the completed facilities.

There are 37 SSK [farm building combines] and DSK [house building combines] within the ministry. Their number will double before the end of the five-year period.

Labor productivity in the rural combines is significantly higher than the average for the ministry. Thus, in 1982 the output per worker comprised 7,527 rubles throughout the ministry, while in the farm building and house building combines it was 11,700 rubles. At some SSK it is even higher: at the Engel's SSK it is 15,000, at the Omsk -- 13,000, and at the Vologda SSK it is 12,000 rubles.

The introduction of new effective structures, improved technology of building production, high degree of plant readiness of products, complete set delivery of structures to the construction site -- all this stems primarily from the SSK.

Eighteen combines manufacture outside wall panels of unilinear cut with installed joinery and textured surface. Ten combines product inside panels, partitions, stairwells and landings ready for painting. Four combines have perfected the manufacture of modular restroom facilities and built-in furniture.

The Novosibirsk, Georgiu-Dezhskiy, and North Caucasus SSK have changed over to the construction of unified fully prefabricated agricultural buildings of multi-purpose function made of large-size structures with high degree of plant readiness which do not require joint welding during installation. This will make it possible to reduce labor consumption by 20 percent and improve the construction quality of production buildings.

Preparations have been made for the mass transition of SSK to the construction of industrial buildings made of lightweight structures (wood laminate, keramzit concrete, asbestos cement) with six-meter span.

In order to improve the level of planning and management, significantly increase the effectiveness of social production, accelerate scientific-technical progress and the growth of labor productivity, and improve product quality, it is necessary to continue the widespread introduction of the system of continuous planning and flow-line construction.

Thanks to the introduction of this system, the Orel'stroy Trust has achieved the rhythmic introduction of residential housing. In the first quarter of 1983 it introduced 26 percent of the annual volume, in six months -- 51 percent, and in nine months -- 76 percent. As a result, the work load has been uniform throughout the year not only for builders, but also for sanitary technicians, electricians, and finishers.

The basic condition for successful work of construction organizations, the main key to the entire string of the building chain is well-planned production-technological outfitting of construction sites with structures, parts, products, materials, equipment, and sanitary-technical and electrotechnical semi-finished products.

Having studied the experience of the major leading construction organizations such as the Glavkrasnoyarskstroy [Construction in Krasnoyarsk Main Administration] of the USSR Mintyazhstroy [Ministry of Construction of Heavy Industry Enterprises], the Ministry of Rural Construction has worked out an extensive program for improving the production-technological outfitting of construction sites and has introduced it into operation.

Today the zone of unitized supply is being expanded. Bases are being created for management of production-technical outfitting, which include shops for tinting, sheet iron and metallic products, glass and linoleum cutting, and others.

The experience of the Ryazan'oblsel'stroy Administration on the introduction of the "Zhelezobeton" [reinforced concrete] system should be promulgated. Here, with the application of computers, a program is being developed for unitized supply of construction sites with prefabricated reinforced concrete and control is being implemented over the manufacture of parts at the enterprise and their delivery to the facilities in accordance with the schedule for production-technological outfitting and installation.

Every day a card is issued which shows what must be done during that day. It contains a running total from the beginning of the month and shows the remainder of unshipped production by each type of part. It also accounts for the number of structures which have not yet been installed at the sites. This accurate information allows the dispatch service and the administration and subsection managers to make efficient decisions.

Such a system must be introduced at every trust and construction administration.

An important factor in further increasing labor productivity in construction is the application of modern labor methods and progressive form of production organization.

This is primarily the contract brigade work order. At present this method encompasses 43 percent of the workers in the ministry. The output in contract brigades for 1982 comprised 13,948 rubles (the average for the ministry was 7,527 rubles).

However, there are still significant shortcomings in the work on promulgating the experience and achievements of science and technology in rural construction. Let us take, for example, wood laminate structures, which are expedient for use in construction of large-span buildings and structures. Due to the absence of project plans, these are presently used for building mineral fertilizer storehouses. Only curvilinear load-bearing structures of the semi-arch type are used for this purpose. In connection with this, the capacities for the production of straight linear structures are for naught.

The capacities for the production of enclosure structures are also not being used to their fullest extent.

The widespread application of lightweight structures in agricultural production construction, as well as in building farmstead type one- and two-story residential houses and cultural-domestic facilities requires improved foundation design. The fact is that submerging the foundations below the point of seasonal freezing of swelling-prone soils leads to the disintegration and deformation of the structure. In connection with this, the TsNIIEPsel'stroy [Central Scientific-Research Institute on Experimental Design and Planning of Rural Construction] of the USSR Minsel'stroy has worked out blueprints for shallow foundations built on pillars made of non-swelling materials (sand, rubble, gravel, slag, etc.). There is also a ratified directive manual on the experimental planning and construction of such foundations under various conditions.

Thus, the ministry has huge reserves at its disposal for the rational application of production capacities, for the introduction of effective structures and materials, modern methods of labor and construction organization, and for the application of mechanisms and means of minor mechanization.

The task consists of managing these more fully and properly, of directing them toward the fulfillment of tasks set forth in the 11th Five-Year Plan and the radical improvement of all work on accelerating technical progress.

In fulfilling this task, it is necessary to be guided strictly by the decisions of the November (1982) and June (1983) Plenums of the CPSU Central Committee on questions of a cardinal increase in labor productivity based on the widespread and accelerated practical introduction of achievements in science and technology and foremost experience.

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## CONSTRUCTION MACHINERY AND EQUIPMENT

### NEW EQUIPMENT DEVELOPED IN IRKUTSK

Moscow MEKHANIZATSIYA STROITEL'STVA in Russian No 2, Feb 84 pp 5-6

[Article by V. I. Il'yin, USSR Minpromstroy [Ministry of Industrial Construction]: "Irkutsk Machinists — on the Honor Roll of the USSR VDNKh [Exhibition of USSR National Economic Achievements]" ]

[Text] There is not a single facility in Irkutsk, or in the entire oblast for that matter, in whose construction the Stroymekhanizatsiya Trust did not take part. Among these facilities are the Azeyskiy Coal Mine, the Irkutsk Aluminum Plant, capacities of the Khimprom Production Association in Usolye-Sibirskoye, a meat combine in Cheremkhovo, a knitwear and furniture factory, the oblast clinical hospital, a metallic structures plant, and others. In recent years, the trust has overfulfilled its production plan assignments. All work is submitted on time or ahead of schedule with high quality and great economy of materials and labor expenditures. Thus, in 1983 most of the facilities were accepted with evaluations of "good" and "excellent", while expenditures for correcting flaws were totally excluded.

The intensive production activity of the trust collective allows it to occupy a high place in socialist competition. According to the results of work in 1982, the Stroymekhanizatsiya Trust was awarded first place in All-Union Socialist Competition in Honor of the USSR's 60th Anniversary and the perpetual Red Banner of the CPSU Central Committee, USSR Council of Ministers, VTsSPS [All-Union Central Soviet of Professional Unions], and VLKSM [All-Union Leninist Communist Youth Union] Central Committee, with entry into the All-Union Honor Roll of the USSR VDNKh.

Clear distribution of responsibilities between the trust's structural subsections and optimal application of funds, forces and technology facilitate the achievement of these high results.

Tower cranes, automobile-type and caterpillar track cranes are concentrated at the Irkutsk Mechanization Administration No 1. Excavation technology and pile driving installations have been collected at Administration No 2. The Shelekhov, Usolye and Cheremkhovo Administrations perform work on excavating foundation pits, vertical planning, installation of subgrades on automobile roads and railroads, assembly of crane rails, pile driving, etc. The Tulun Administration, aside from performing this work, also lays communications lines

and makes territorial improvements. All the mechanization administrations submit machines along with service personnel to construction organizations and industrial enterprises on subcontracting, rental and leasing agreements. The Shelekhov Administration includes a sector on hydromechanized work which obtains gravel for enterprises of the construction industry. The trust also has a material-technical supply office and a mechanical repair plant.

The management of the trust and the administrations has taken a course toward the overall introduction of the contract brigade work order. The basic criterion for evaluating the activity of the brigade has become the fulfilled and normative time for stages of work. The ultimate goal of the cost accounting machinist brigades is to reduce the time and the estimated cost of work.

Considering the great importance of auto transport drivers in the end results of the work, agreements were concluded with auto transport organizations on the basis of which the drivers were included in the cost accounting brigades. Such brigades are called mechanized complexes. The essence of their work is that the machinist crews of excavators, bulldozers and dump truck drivers promise to fulfill a certain volume of work ahead of schedule. The amount of the award they receive depends on the reduction in construction time and the reduced construction cost. Moreover, the members of the brigade receive monetary remuneration for savings of materials, fuel, spare parts, electrical energy, etc. Such cost accounting complexes achieve better indicators as compared with ordinary brigades which work only by job orders and which are not unified with the end result.

Among the mechanized complexes, the collective headed by excavator machinist I. P. Aniper stands out especially. Working on the vertical planning of the second phase of the electrothermal shop of the Irkutsk Aluminum Plant, the brigade worked 150,000 m<sup>3</sup> of ground, completing its work 10 days ahead of schedule and fulfilling the program for the first three years of the five-year period in two years and five months. The brigade of excavator machinist V. I. Zubkov, working on the construction of the second phase of the heat and power plant, fulfilled the three-year plan in two years and seven months. The mechanized complex of V. V. Puzhinin, which includes two excavator machinists, a bulldozer operator, a grader machinist and eight dump truck drivers, is also working with high productivity. The brigade has excavated and removed 58,700 m<sup>3</sup> of dirt, completing its work at one of the facilities of the Azeysk Coal Mine one month ahead of schedule. As we can see, mechanized complexes have become the shock force of the Stroymekhanizatsiya Trust, and it is they which are directed toward the most difficult work sectors.

Much attention is given at the trust to introducing the latest achievements of scientific-technical progress into production. In the two years and five months of the current five-year period, an economic effect of 526,700 rubles has been obtained from the mastery of new engineering and progressive technology. Labor productivity during this period has increased by 1.4 percent, while labor expenditures have been reduced by 24,600 man-days.

Scientists afford inestimable aid to the machinists. In conjunction with the Novosibirsk Institute of Central Heating, the Siberian Department of the USSR Academy of Sciences has developed and introduced into production a method of artificial heat protection of the ground against freezing using polymer foam.

With the aid of specialists from the Department of Bases and Foundations of the Odessa Engineering-Construction Institute, progressive types of foundations are being introduced into practical application. These are pyramidal piles for use under the complex engineering-geological conditions of Eastern Siberia. The use of these pilings instead of prismatic ones has yielded a savings of materials in the amount of almost 300,000 rubles in the construction of residential housing in the microrayons of Novo-Lenino, Novo-Mel'nikovo, Solnechnyy, Privokzal'nyy of the city of Shelekhovo alone.

The Krasnoyarsk Promstroyniiprojekt Institute helped to develop the NBO-2200 installation, which bores a hole up to 22m deep and over 800mm in diameter. The economic effect from its introduction has been over 80,000 rubles.

Novosibirsk scientists have played an active part in introducing the oil analyzer. The annual effect from its introduction in servicing 350 units of construction technology comprises 10,100 rubles and a reduction in labor expenditures in the amount of 5,250 man-days.

Four motor oil diagnostic centers have been set up at the trust. These make it possible to regulate the times for lubricant replacement depending on its condition. The centers are staffed by master diagnosticians who compile a plan schedule for performing the analyses. The results are recorded in a special journal. This makes it possible to determine the condition of motor oils for each unit in the construction machine pool. The diagnostic center makes it possible to save up to 10 tons of oil per year.

The concord between builders and science gives good results. Therefore, these ties will continue to be strengthened in the future. Thus, in 1984 the performance of joint work is planned, for example, with the Krasnoyarsk Promstroyniiprojekt on improving the lubrication system and hydraulic system of construction machines; with the Irkutsk Polytechnical Institute on the development of technological norms for the expenditure of fuel-lubricant materials and their recycled application, etc.

Another direction in which technical progress is developing in the trust subsections is innovation and invention. The result of their fruitful activity is the well-deserved achievements among innovators of Siberia and the country.

In the two years of the 11th Five-Year Period, 712 innovative proposals have been developed and introduced into production. Of these, 306 were directed toward the mechanization of manual and labor consumptive processes and 352 toward improving the quality and increasing economy of material-technical resources. The economic effect comprised 1,020,400 rubles. There was a savings of 150,000 kW·hr of electrical energy, 2,000 Gcal of thermal energy, 50 tons of diesel fuel, and 48.3 tons of metal.

In 1983 the collective of innovators labored under the slogan: "To the 6th Congress of the All-Union Society of Inventors and Innovators -- a Worthy Greeting!", and has achieved great success.

The number of VOIR [All-Union Society of Inventors and Innovators] members has increased to 600 people. They are united into 41 creative integrated brigades (KTB [Technological-Design Bureaus]), workers cooperatives and ITR [engineering-technical workers]. For example, the Shelekhovo RMZ [mechanical repair plant] brigade headed by B. A. Tunik has developed and introduced a technology for making suspension lines by the method of crimping with an aluminum liner, which replaces the rather labor consumptive process of finishing the ends of the cable by weaving. Under the old method, several hours of trained labor were necessary for cable splicing. Under the new method, only several minutes are required. Metal is also saved. A 1.5m long piece of cable is needed for splicing a 38mm diameter cable by hand. With the aluminum liner crimping method, only 178mm of cable is required. The possibility of dislocation or damage to the equipment is eliminated, since the cable is not unwound or spliced. The service life of the cable is increased (since the new method of end-to-end connection has a more long-lasting operational resource), and the strength and quality of the lining is improved. The aluminum crimped lining becomes an integral part of the steel cable. Therefore, the juncture according to the new method is stronger than the cable itself.

Aside from finishing the cable ends, the technological process of making suspension lines provides for a number of other labor consumptive manual operations: cleaning and separating the cable, making the eyelet, forming the eyelet loop. All the equipment with the exception of the device for making the load-bearing ring was developed and manufactured by the efforts of the plant.

A production building with area of  $22m^2$  is necessary for placement of the complex. It includes: an unwinding device with horizontal rotation axis, an installation for cleaning the cable in a special solution, an installation for unwinding and cable feed, an installation for electromechanical cutting of the cable, a measuring table with movable support for obtaining stock of cable branches of a given length, an installation with hydraulic drive for bending the eyelets and forming the loop on the eyelet, a pipe bender with set of accessories for making the ring and disengaging lugs, a machine tool for bending the eyelets, a machine tool for cutting the cable, a machine tool for weaving the ends of the cable, a pneumatic hammer for crimping the cable after end weaving, and a cable test bench.

The use of four hydraulic cylinders makes it possible to simultaneously test four cable branches. The productivity of this complex is 2000 suspension lines per year. The utilized capacity is 163 kW. A three-man team services the complex.

The technological complex may be used at repair and construction plants and at any machine building plant, as well as at construction administration mechanization bases. The method of joining branches of steel cables with the aid of an aluminum liner is more progressive than other methods used for these purposes.



The technological equipment for the complex was developed and produced by the efforts of the plant and differs significantly from analogous equipment used at other enterprises by its design as well as by its technical characteristics.

The development of the complex made it possible to obtain a 2.5-time increase in labor productivity. The annual economic effect from its introduction comprised 36,800 rubles, with a 843 man-day reduction in labor expenditures. In 1983 this technological complex was awarded the medal of the USSR VDNKh.

The technological process of capital repair on the T-100M tractor used prior to 1981 entailed a large number of labor consumptive manual operations. This was explained by the absence of special equipment: load lifting, fitting-installation, testing-experimental equipment, etc. The greatest volume of manual work was used in repairing the on-board reducer assembly (production of installation and disassembly operations).

A specially designed 150-ton installation press was developed for the mechanization of this process by plant innovators N. G. Vladimirov, A. I. Rogach, and V. A. Yakovlev. The peculiarity of this press was the fact that it ensured the mechanized installation process of the leading star wheel on the T-100M tractor with the hub. The required seating and assembly dimensions are adhered to in this process. The feed of the star wheel - hub - casing - driven gear assembly into the zone of action of the press is converted to hydraulic operation by a special device. Full assembly of the indicated unit is ensured with the aid of the press. Previously, all operations on adapting the hub to the dimensions of the star wheel, as well as pressing of the bearings was done by hand -- with a sledgehammer. The reducers were assembled separately: each part was installed on the frame and secured by hand. The use of the press eliminated these labor consumptive operations, since the process of installation of assembled reducers is done with the aid of a crane. The press is also used in repairing of metallic constructions on the D-271 bulldozer, in assembly-disassembly work, in capital repair of drive assemblies for the purpose of restoring seating dimensions of roller bearing openings, for restoring hubs by the expansion method, etc. The average annual economic effect from the introduction of this press comprised 712 man-days.

Innovators proposed and introduced a new method of mobile transport for series KB tower cranes. It differs from the standard method (on roller axles) as follows: the drive carriage of the tower crane is loaded onto a TO-18 frontal loader, eliminating operations on manual turn control of the roller axles and manual labor for rolling the roller axle under the tower crane portal, and significantly reducing the turn radius curve of the tractor-trailer rig. As a result of increased load on the drive axles of the KrAZ-257 basic tow vehicle and the use of the TO-18 loader, the tow force of the tractor-trailer rig is increased, which reduces its possible skidding and significantly reduces the load on the metallic structures of the transported crane. Radio-telephone communication is established between the driving KrAZ-257 tow truck and the driven TO-18, and the tow vehicles are equipped with blinker lights. The annual economic effect from the introduction of this method is 47,200 rubles, and the reduction in labor expenditures comprises 1,330 man-days.

An important role in the innovative movement is the socialist competition for the title of "Best Creative Collective in Technical Progress", "Best Creative Brigade", "Best Trust Innovator," and "Best Young Innovator". Among the winners of the socialist competition for innovators in mechanics from the Usol'sk Mechanization Administration were I. V. Nikitin and A. G. Lashkin, electrician V. P. Paneyev, lathe operators V. M. Gorbatskiy and V. Ya. Fedurin, and deputy director of the technical section B. A. Tunik and others.

In the 11th Five-Year Plan, the trust workers have set themselves a new task -- to improve the quality of work fulfilled even more. For this they created a technical inspection headed by the trust's chief engineer which began to regularly, according to plan, conduct spot checks on the quality of construction-installation work, verify adherence to technical conditions and GOSTs [All-Union State Standards], and check on the knowledge of the on-line ITP. The activities of the technical inspection facilitated an increase in the quality of building production.

In 1982, the introduction of a comprehensive system of quality control over completed building production (KS UKSP) was begun at subsections of the Stroy-mekhanizatsiya Trust. For its quickest possible realization, coordination groups were organized at the administrations, managed by the chief engineers, technical training of specialists is being conducted, and standards are being developed for basic types of stages of work.

The administration and party and social organizations give much attention to labor and living conditions of the mechanics. As a result, work force fluidity has dropped from 5.6 percent in 1982 to 3.3 percent in 1983. However, there are still some unsolved problems. The most important of these is the shortage of residential housing. This problem must also be solved for further securement of the work force.

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## BUILDING MATERIALS

### BELOUSSIAN BUILDING MATERIALS INDUSTRY DESCRIBED

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[Article by S. Akulich, 1st deputy minister of Belorussian Construction Materials Industry and candidate of economic sciences, Minsk: "Importance of Equipment"]

[Text] Enterprises of the Belorussian Construction Materials Industry are producing more than 130 type of products and structures. Capabilities have been created practically anew for the production of ceramic drainage and asbestos-cement pipe, dolomitic meal, many types of progressive finishing-off and covering materials, porous fillers, glass fiber mats and products made for silica-concretes for the thermal insulation of roofing. The production of brick and other products has increased. This has been achieved not only through the construction of new enterprises but also largely as a result of the modernization and technical re-equipping of a majority of the existing plants and combines. During this current five-year plan, for example, three fourths of all resources allocated for development of the branch are to be used for this purpose. Close collaboration between the production workers and the planning and scientific-research organizations is promoting the achievement of this goal.

It can be immediately stated that our chief concern is that of improving the production of bricks. This derives from the fact that the equipment and technology employed by the plants, owing to a variety of factors, leave a great deal to be desired. We began by substituting tunnel-type furnaces for the obsolete ring furnaces. This year 80 percent of the clay bricks are being baked in them. We installed automatic stackers and in this manner we released more than 1,000 workers from having to perform manual labor. These individuals were then available for work in other production sectors.

In addition to mechanizing labor-intensive processes during the modernization and renovation of plants, we also solved a number of economic problems: we lowered the material intensiveness of the operations and also fuel consumption. We are lowering the material intensiveness of the work as a result of having organized the production of hollow brick and concrete blocks.

Many of our enterprises are already producing such products, with this production amounting to almost 50 percent of the overall production volume.

One means for economizing in the use of fuel -- the introduction of systems for the impulse combustion of liquid fuel material in tunnel furnaces. The effectiveness and value of this method lies in the fact that the baking process itself is automated, the quality of the product is raised and fuel consumption is lowered by 10-12 percent. Two such systems have been introduced into operations at the Molodechno Construction Materials Combine. They operate in a stable and reliable manner. We assigned the task of converting the work of all 20 furnaces over to the use of this method. However the production of equipment is inadequate for this task and certain design imperfections are delaying the introduction of this progressive system into operations on a mass scale. It is our opinion that a special purpose all-round program should be developed for the centralized production of systems for the impulse combustion of liquid fuel and for introducing them into operations. The results to be realized from their introduction are already quite obvious.

The technical reequipping of the branch had a beneficial effect on the use of secondary raw materials. Many of our enterprises are utilizing waste paper, rags, slag and broken glass.

Specialists attached to a leading scientific organization -- Minsk Scientific Research Institute of Construction Materials -- jointly with the collectives of the basic enterprises of the Minskstroymaterialy Association, the Gomel Glass Plant and others carried out studies and developed a technology for the production of clay brick using granite siftings obtained from the crushing of stone at the Mishkevichi Combine. The Grodno and Molodechno combines are producing such brick, while preparations are being made at Polotsk, Brest and also at the Gorynskiy and Obol ceramic plants for utilizing granite siftings. The use of siftings lowers the consumption of fuel during the baking of brick and raises its frost resistance.

In addition, as revealed during experiments, granite dust can also be employed successfully in the production of decorative concrete polymer covering plates, which simulate the surface finish of natural stone. The technology for this process has been developed and the task is now one of creating a test-experimental line with a capability for producing 50,000 square meters of plate annually.

Today, using industrial waste materials, the ministry's enterprises are producing 203 million rubles worth of products annually, or 43 percent of the overall volume. Certainly, this is not a maximum figure. But recently this progressive advance has slowed down. The weak organization of transport operations has become a serious obstacle. Slag, ash, cinders and other secondary materials are not nomenclature items for the railroad workers; these items are the last to be transported and even then in a very spasmodic manner.

Yes and the enterprises themselves -- the suppliers of the secondary raw materials -- are not interested in timely shipments, especially if a requirement exists for preliminary utilization, dehydration or refinement of



the waste products. For example, the so-called nepheline "tailings" -- waste products of the Apatity Production Association -- are suitable for the production of ceramic plates, foam glass and dark green bottles. The Minskstroymaterialov Association alone requires 20,000-25,000 tons of these waste products annually. But this valuable raw material is still being sent to the dumping grounds. It is our opinion that the sales volume for secondary resources should ideally be planned for the supplier-enterprises.

During the technical re-equipping of the enterprises, we will display concern for ensuring that their output will be more effective both for production and construction purposes. As a result, the materials and products require considerably fewer labor expenditures and savings are realized both in the raw materials and in the completed items. Thus the Krichevtsementoshifer Association is producing large sheets of slate. Almost 10 kilograms less of asbestos and 60 kilograms of cement are now being consumed for each 100 square meters of roofing. And labor intensiveness in construction has been lowered by 20 percent. The production of asbestos-cement pipe 5 meters in length has been mastered at the Volkovysk plant. As a result, the pipe assemblers have had to perform less work in connection with sealing the joints and the requirement for connecting sleeves has decreased.

We have created large capabilities for producing structures made from porous silica concrete. Industrial and cultural-domestic buildings are annually being erected throughout the republic having areas of approximately 600,000 square meters, the walls of which are installed using porous silica-concrete structures. In the process, a savings of almost 60,000 tons of cement is realized.

There is still one other achievement that I would like to mention. Aerofol mills produced according to our order by Uralt'yazhmash /Ural Heavy Machinery Plant/ specialists have been introduced into operations at the Dolomit Production Association. This new method for milling limestone into powder has made it possible to realize an annual savings of 500 tons of metal, approximately 7,000 tons of conventional fuel and more than 9 million kilowatt hours of electric power.

Unfortunately, not all of us have succeeded in doing as we would like. Fuel consumption is still high at plants engaged in the production of bottles and cans used for canned products. The principal reason -- a low level of production: obsolete equipment and a shortage of spare parts. At many enterprises the glass-making machines are in need of modernization and shaping machines should be installed. Only in this manner will it be possible to raise the productivity of the plants and achieve a substantial savings in the use of fuel.

The technical re-equipping of the branch is having a very beneficial effect with regard to increasing production and improving the economic indicators. The specialists attached to the ministry, scientific organizations and associations, jointly with the collectives of enterprises, are maintaining the established tempo and continuing the campaign aimed at furthering scientific-technical progress throughout the branch.

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SOLUTIONS PROPOSED FOR PROBLEMS IN RAW MATERIAL TRANSPORT

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[Article by V.I. Zav'yalov, candidate of Technical Sciences; and E.P. Severinova, engineer at Promtransniiprojekt: "Progressive Plans for Mechanizing the Unloading of Non-Metal Materials at Precast Concrete Plants"]

[Text] Of 18 plants of the precast concrete industry of USSR Minstroy materialov [Ministry of the Construction Materials Industry], 16 are being supplied with raw materials (sand, crushed stone, gravel) by railroad transport and two (Daugavpils and Vishnevskiy concrete sleeper plants) -- by motor transport.

The volume of non-metallic materials being transported by rail is 3.3 million tons, including crushed stone -- 2.5 million tons and sand -- 0.8 million tons. The suppliers of non-metallic materials are located in climatic zones II-VI. As a rule, the suppliers and consumers are located in the same climatic zone, with the exception of the Zaporozhye Plant for Reinforced Concrete Pipe and Supports and the Gnivan Plant for Concrete Sleepers. They are located in climatic zone III and their suppliers -- in climatic zone IV. Seventy percent of the plants are located in climatic zones IV-VI, the coldest 5-day temperature of which is lower than -20° Centigrade. Since the transport time for a majority of the materials is more than 1.5 days, during the cold period of the year the non-metallic materials freeze during the transport process owing to their high moisture content. The transport volume for frozen non-metallic materials is 970,000-980,000 tons annually.

The precast concrete plants can be divided into three groups according to the annual delivery volumes for the non-metallic materials: I -- up to 100,000 tons of non-metallic materials, with two plants in the group; II -- from 101,000 to 300,000 tons, with 12 plants; III -- from 301,000 to 500,000 tons or more, with two plants.

An analysis of the mechanization equipment available for unloading non-metallic materials at ZhBI [reinforced concrete products plant] plants has shown that the unloading of frozen freight at a majority of the plants is carried out manually with preliminary loosening and using grab buckets. This results in considerable idle time and in freight car breakdowns. Some plants employ a drilling and loosening machine and an attached vibrator for unloading the balance of the frozen freight.

The mechanization equipment for unloading non-metallic materials must be selected taking into account the climatic zones in which the suppliers and consumers are located and also the annual delivery volumes by rail transport.

Six efficient systems for mechanizing the unloading of non-metallic construction materials have been developed and recommended for use by Promtransniiprojekt

Plan 1 includes a railroad siding unloading area equipped with a 4-hopper receiving unit. The loosening and unloading of the frozen freight is carried out through the open hatches of a freight car using a BRM-80/110 drilling and loosening machine designed by Promtransniiprojekt or a PR-115 machine designed by VNIIsroydormash /All-Union Scientific Research Institute of Construction and Road Machinery/. The balance of the freight is removed from the freight car using the attached vibrator designed by the Uralsk Department of VNIIZhT /All-Union Scientific Research Institute of Railroad Transportation/ or Promtransniiprojekt. The open freight cars are moved into the unloading area by means of an MU-12M maneuvering unit having a winch tractive power of 12 ton-force. At the exit from the railroad unloading area, a unit designed by Promtransniiprojekt is installed for closing the hatch covers of the open freight car.

The work is carried out in the following manner. The maneuvering unit moves an open freight car under the cutters of the drilling and loosening machine, after which the cutters are lowered vertically. The loosening and unloading work is conducted through the open hatches during continuous movement of the open freight car. Once the unloading is completed, the cutters are raised and the next freight car is moved up. The remainder of the freight is removed using a vibrator plate that is mounted on the telepher; the vibrator plate is readjusted 3-4 times to conform with the upper flange of the open freight car.

The cleaning time for one open freight car is 4-5 minutes. Subsequently the freight car is moved by means of a maneuvering unit up to another unit for the closing of the hatch covers.

The plan is recommended for use in climatic zones III-VI and for an annual freight turnover of up to 500,000 tons. The production of the BRM-80/110 drilling and loosening machine is being mastered by the Donskoy Remstroy Mash Plant (city of Donskoy in Tula Oblast). The PR-115 drilling and loosening machine is being serially produced by the Perm Repair-Mechanical Plant. The vibration cleaning unit is being produced in small batches at the Kuybyshev Glavremmekh Plant of the USSR MPSM /Ministry of Building Materials Industry/ and at an experimental mechanical plant of the Uralsk Branch of VNIIZhT. The MU-12M maneuvering unit employs a tractive winch produced by the Donetsk imeni 15-Letiya LKSMU /Lenin Young Communist League of the Ukraine/ Plant. However, the industrial production of this unit has still not been organized.

Plan 2 consists of a railroad unloading area with track that is raised 2.5 meters. The loosening and unloading of frozen bulk freight are carried out using a drilling and loosening machine that is installed on a special gantry. The machine is stationary and has point unloading. A bulldozer having a maximum blade width of 4,500 millimeters is used for picking up and moving the



unloaded material. The same mechanisms employed for Plan 1 are used for removing the remaining freight from an open freight car, closing the hatch covers and moving the freight car in the unloading area.

This system is recommended for use in climatic zones III-VI and for a freight turnover of up to 500,000 tons annually.

Plan 3 is intended for unloading loose freight from open freight cars using a TR-2A unloader. The unloader is self-propelled on a rail gantry, on which a scraper conveyer line is installed for picking up and delivering the freight to a stacker belt conveyer line, used for storing the material. The open freight cars are unloaded without opening the hatch covers. The remainder of the freight is removed manually through 2-3 open hatches, the number of which is dependent upon the type of freight. The remaining freight is usually removed through open hatches on the ends or in the middle of the freight car.

The plan is recommended for use in climatic zones I and II and for an annual freight turnover of up to 1 million tons. It can be employed in other climatic zones only for the unloading of non-frozen bulk freight. The unloader is being serially produced at the Orsk Construction Machine Plant.

Plan 4 is intended for the loosening, unloading and removal of the residue of frozen freight, through the open hatches of an open freight car on raised railroad track using suspended DP6-S (V1-643) or V1-614 vibration-looseners. The vibration-looseners are suspended from a load hook of a truck-mounted crane which operates on the basis of pneumatic or caterpillar drive. Their load lifting capability at the 10 meter height of the crane's hook must be not less than 7 ton-force for a boom span of no more than 6 meters. During operation, the crane advances through the unloading area successively processing the unloaded open freight cars. The vibration-loosener is operated 3-4 times per freight car and in the process the guide frame for the shaft looseners must be lowered to the upper flange of the open freight car. A train consisting of several open freight cars is moved into the unloading area by a shunting locomotive. The hatch covers of an open freight car can be closed at the exit from an unloading area using a special unit designed by Promtransniiprojekt. When 4-5 freight cars containing freight arrive daily, control over the closing of the hatch covers is carried out manually.

The plan is simple to service and is used extensively in climatic zones III-VIII. The looseners are produced serially: DP-6S (V1-643) -- by the Chelyabinsk Stroydormashina Plant and the Kuybyshev Experimental-Mechanical Plant and the V1-614 unit -- by the Novosibirsk Trud Plant.

Plan 5 calls for a defrosting garage having gas infra-red burners and a capacity for 1-2 open freight cars. A filmy thawing out of the freight is achieved within 25-30 minutes in the garage, after which the open freight car is moved into the railroad unloading area, equipped with a drilling and loosening machine and a hopper receiving unit. The loosening, unloading and removal of the remaining freight from the open freight car are carried out through open hatches using a drilling and loosening machine with a continuously operating vibrator, the availability of which improves the operating conditions for the cutters and reduces the unloading time. The productivity of



the unloading complex is one freight car per hour. For raising the hatch covers at the exit from the unloading area, a special unit similar to that used for closing them in Plan 4 is installed.

Plan 5 is intended for use in climatic zones V-VIII, when unloading frozen monolithic bulk freight. The technical documentation for a drilling and loosening machine with a continuous operating vibrator and for a defrosting garage with gas infra-red burners was developed by Promtransniiprojekt.

Plan 6 consists of two railroad unloading areas equipped with the same mechanisms used for Plan 1. It is recommended for unloading frozen freight from open freight cars at enterprises having annual freight volumes in excess of 500,000 tons and located in climatic zones III-VI.

The introduction into operations of these mechanized systems will make it possible to eliminate heavy manual labor for the loosening of frozen freight in open freight cars, it will reduce the idle time of these freight cars during unloading operations by a factor of 3-4 and it will raise the level of mechanization for the unloading of bulk frozen freight by 15-20 percent and the degree of mechanization -- by 10-15 percent.

More detailed information can be obtained from Promtransniiprojekt at the address: 117331, Moscow, Vernadskiy Avenue, 29.

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